

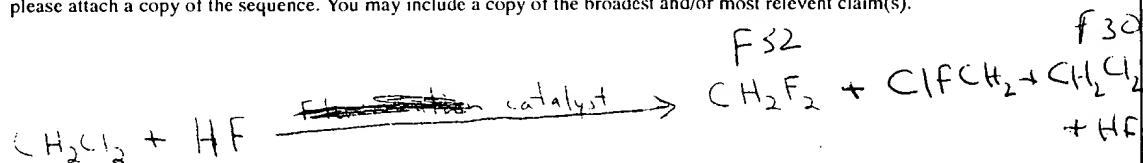
Paula Sheppard

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L1           30 SEA FILE=REGISTRY ABB=ON PLU=ON CH2CL2/MF  
L3           11 SEA FILE=REGISTRY ABB=ON PLU=ON CH2F2/MF  
L4           10 SEA FILE=REGISTRY ABB=ON PLU=ON FH/MF  
L5          24252 SEA FILE=HCAPLUS ABB=ON PLU=ON L1 OR ?DICHLORO?(5A)?MET  
              HANE? OR ?DICHLOROMETHANE?  
L7          5936 SEA FILE=HCAPLUS ABB=ON PLU=ON L3 OR ?DIFLUORO?(5A)?MET  
              HANE? OR ?DIFLUOROMETHANE?  
L9          42093 SEA FILE=HCAPLUS ABB=ON PLU=ON L4 OR ?HYDROFLUORO? OR  
              HYDRO?(A)?FLUOR?  
L11         40 SEA FILE=HCAPLUS ABB=ON PLU=ON L5(L)L9(L)L7

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L11 ANSWER 1 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
AN 1998:183906 HCAPLUS  
DN 128:206163  
TI Process and catalysts for the continuous preparation of  
difluoromethane by the fluorination of  
dichloromethane with hydrogen fluoride  
SO Eur. Pat. Appl., 5 pp.  
CODEN: EPXXDW  
IN Wilmet, Vincent; Janssens, Francine  
PI EP 829462 A1 980318  
AI EP 97-202745 970904  
PY 1998  
AB Difluoromethane is prep'd. in a continuous process by the  
fluorination of dichloromethane with hydrogen  
fluoride in a liq. reaction mixt. contg. org. and inorg.  
(e.g., the catalyst SNC14) fractions. The org. fraction in the liq.  
medium is ltoreq.25% of the sum of wt. of the org. and inorg.  
fractions and the wt. of the dichloromethane in the liq.  
medium is ltoreq.10% of the sum of the org. and inorg. fractions.

IT 75-10-5P, **Difluoromethane**  
 RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)  
 (process and catalysts for the continuous prepn. of  
**difluoromethane** by the fluorination of  
**dichloromethane** with **hydrogen fluoride**  
 )

IT 75-09-2, **Dichloromethane**, reactions  
 7664-39-3, **Hydrogen fluoride**, reactions  
 RL: RCT (Reactant)  
 (process and catalysts for the continuous prepn. of  
**difluoromethane** by the fluorination of  
**dichloromethane** with **hydrogen fluoride**  
 )

L11 ANSWER 2 OF 40 HCAPLUS COPYRIGHT 1998 ACS

AN 1998:134442 HCAPLUS

DN 128:171431

TI Hydrolytic decomposition of dichlorodifluoromethane on modified zirconium oxide surfaces

SO Catal. Lett. (1998), Volume Date 1997, 49(3,4), 199-205  
 CODEN: CALEER; ISSN: 1011-372X

AU Hess, A.; Kemnitz, E.

PY 1998

AB The hydrolytic decompn. of dichlorodifluoromethane (CFC-12) on various modified Zr oxide surfaces was studied. The reaction was carried out under flow conditions at 500.degree.. Complete CFC-12 conversion and long-time stability of the catalysts were achieved accompanied by a limitation of the undesired CFC-13 formation. The max. CFC-12 conversion was obsd. on catalysts of sulfated zirconia or zirconia obtained from temp.-controlled calcination of Zr oxide hydrate. The reaction depends on the presence or in situ formation of Bronsted acid sites. FTIR-photoacoustic measurements were performed on pyridine complexes chemisorbed on the catalyst surface in order to analyze the changes in the catalyst acidity. The effects of the temp. and water in the reaction gas on the catalyzed compon. of CFC-12 are examd.

L11 ANSWER 3 OF 40 HCAPLUS COPYRIGHT 1998 ACS

AN 1998:7029 HCAPLUS

DN 128:61200

TI Hydrodehalogenation of dichlorodifluoromethane (CFC-12) on supported metal catalysts

SO Arch. Ochr. Srodowiska (1997), 23(3-4), 47-57  
 CODEN: AOSRD6; ISSN: 0324-8461

AU Czajka, Bogdan; Kirszensztein, Piotr; Wachowski, Leszek; Lopatka, Renata; Bell, Tom N.; Becalski, Adam

PY 1997

AB The reaction of CC12F2 (CFC-12) with dihydrogen has been studied on a Me/.gamma.-Al<sub>2</sub>O<sub>3</sub> catalysts (where Me = Ru, Fe or Ni) contg. 0.26, 0.52 and 1.56 mol% of an appropriate metal. The product (distribution) and the extent of conversion was shown to be highly dependent both on the kind and coverage of certain metals, and on the temp.

L11 ANSWER 4 OF 40 HCAPLUS COPYRIGHT 1998 ACS

AN 1997:798580 HCAPLUS

DN 128:16653

TI Vapor-Liquid Equilibria for the Systems Difluoromethane + Hydrogen Fluoride, Dichlorodifluoromethane + Hydrogen Fluoride, and Chlorine + Hydrogen Fluoride

SO J. Chem. Eng. Data (1998), 43(1), 13-16  
 CODEN: JCEAAZ; ISSN: 0021-9568

AU Kang, Yun Whan

PY 1998

AB Isothermal vapor-liq. equil. for **difluoromethane** + **hydrogen fluoride**, **dichlorodifluoromethane** + **hydrogen fluoride**, and chlorine + **hydrogen fluoride** have been measured. The exptl. data for the binary systems are correlated with the NRTL equation with the vapor-phase assocn. model for the mixts. contg. **hydrogen fluoride**, and the relevant parameters are presented. The binary system **difluoromethane** + **hydrogen fluoride** forms a homogeneous liq. phase, and the others form min. boiling heterogeneous azeotropes at the exptl. conditions.

IT 75-10-5, **Difluoromethane** 7664-39-3,  
**Hydrogen fluoride**, properties  
RL: PRP (Properties)  
(systems; vapor-liq. equil. for systems **difluoromethane** + **hydrogen fluoride**,  
**dichlorodifluoromethane** + **hydrogen fluoride**, and chlorine + **hydrogen fluoride**)

L11 ANSWER 5 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
AN 1997:776136 HCAPLUS  
DN 128:36364  
TI Azeotropic distillation process for separating difluoromethane from dichlorodifluoromethane  
SO PCT Int. Appl., 14 pp.  
CODEN: PIXXD2  
IN Cerri, Gustavo; Kong, Kin Ching; Swain, Charles Frances; Basu, Rajat Subhra  
PI WO 9744301 A1 971127  
AI WO 97-US8674 970522  
PY 1997  
AB Dichlorodifluoromethane is sepd. from difluoromethane by making use of the azeotrope formed by these 2 compds. and removing the difluoromethane as a distn. bottoms product.  
IT 7664-39-3, **Hydrogen fluoride**, reactions  
RL: RCT (Reactant)  
(azeotropic distn. process for sepg.  
**dichlorodifluoromethane** from **difluoromethane**)

L11 ANSWER 6 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
AN 1997:732129 HCAPLUS  
DN 127:347906  
TI Fluorination process for the preparation of **difluoromethane** from **dichloromethane** and **hydrogen fluoride**  
SO Eur. Pat. Appl., 9 pp.  
CODEN: EPXXDW  
IN Garrait, Dominique; Guiraud, Emmanuel  
PI EP 805136 A1 971105  
AI EP 97-400754 970402  
PY 1997  
AB **Difluoromethane** is prep'd. by the fluorination of **dichloromethane** and **hydrogen fluoride** in the presence of chlorine and a fluorination catalyst. The reaction mixt. is distd. to produce a head product, contg. HCl and **difluoromethane**, and a bottoms product, contg. 90% of the nonreacted **dichloromethane**, **hydrogen fluoride**, and **chlorodifluoromethane**, which bottoms product is recycled to the fluorination reactor. A process flow diagram is presented.  
IT 75-10-5P, **Difluoromethane**  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(fluorination process for the prepn. of **difluoromethane** from **dichloromethane** and **hydrogen fluoride**)

- IT 75-09-2, Dichloromethane, reactions  
 7664-39-3, Hydrogen fluoride, reactions  
 RL: RCT (Reactant)  
 (fluorination process for the prepn. of difluoromethane  
 from dichloromethane and hydrogen  
 fluoride)
- L11 ANSWER 7 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1997:281849 HCAPLUS  
 DN 126:263837
- TI Vapor-phase process and catalysts for the production of  
 difluoromethane from hydrogen fluoride  
 and dichloromethane
- SO PCT Int. Appl., 14 pp.  
 CODEN: PIXXD2
- IN Clemmer, Paul Gene; Smith, Addison Miles; Tung, Hsueh Sung; Bass,  
 John Stephen
- PI WO 9711043 A1 970327  
 AI WO 96-US14734 960913  
 PY 1997
- AB Difluoromethane (i.e., HFC-32; I) is prep'd. in high yield and  
 selectivity by: (A) preheating a mixt. of HF (II) and Cl<sub>2</sub>CH<sub>2</sub> (III)  
 to form a vaporized and superheater compn.; (B) reacting this  
 superheated compn. in the presence of a fluorination catalyst (e.g.,  
 Cr<sub>2</sub>O<sub>3</sub>/Al<sub>2</sub>O<sub>3</sub>) to form a product stream contg. F<sub>2</sub>CH<sub>2</sub>, ClFCH<sub>2</sub> (IV), HCl  
 (V), Cl<sub>2</sub>CH<sub>2</sub>, and HF; (C) distg. the product stream to produce a  
 high-boiling stream comprising II, III, and IV, and a low-boiling  
 stream comprising I, II, and V; and (D) recovering substantially  
 pure I from the low-boiling distn. fraction.
- IT 75-10-5P, Difluoromethane  
 RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP  
 (Preparation)  
 (vapor-phase process and catalysts for the prodn. of  
 difluoromethane from hydrogen fluoride  
 and dichloromethane)
- IT 75-09-2, Dichloromethane, reactions  
 7664-39-3, Hydrogen fluoride, reactions  
 RL: RCT (Reactant)  
 (vapor-phase process and catalysts for the prodn. of  
 difluoromethane from hydrogen fluoride  
 and dichloromethane)
- L11 ANSWER 8 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1997:145152 HCAPLUS  
 DN 126:143889
- TI Catalytic gas-phase fluorination synthesis of  
 difluoromethane from dichloromethane and  
 hydrogen fluoride
- SO Eur. Pat. Appl., 8 pp.  
 CODEN: EPXXDW
- IN Requieme, Benoit; Lacroix, Eric; Lantz, Andre  
 PI EP 751107 A1 970102  
 AI EP 96-401150 960529  
 PY 1997
- AB CH<sub>2</sub>F<sub>2</sub> is prep'd. by the reaction of CH<sub>2</sub>Cl<sub>2</sub> (I) with anhyd. HF in the  
 presence of 0.1-5 mol O<sub>2</sub> per 100 mol of I at 330-450.degree. in the  
 presence of an optionally supported Cr catalyst.
- IT 75-10-5P, Difluoromethane  
 RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP  
 (Preparation)  
 (catalytic gas-phase fluorination synthesis of  
 difluoromethane from dichloromethane and  
 hydrogen fluoride)
- IT 75-09-2, Dichloromethane, reactions  
 7664-39-3, Hydrofluoric acid, reactions  
 RL: RCT (Reactant)

(catalytic gas-phase fluorination synthesis of  
**difluoromethane from dichloromethane and**  
**hydrogen fluoride)**

L11 ANSWER 9 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1997:140671 HCAPLUS  
 DN 126:136256  
 TI Isothermal Vapor-Liquid Equilibria for the Systems 1-Chloro-1,1-difluoroethane + Hydrogen Fluoride, 1,1-Dichloro-1-fluoroethane + Hydrogen Fluoride, and Chlorodifluoromethane + Hydrogen Fluoride  
 SO J. Chem. Eng. Data (1997), 42(2), 324-327  
 CODEN: JCEAAX; ISSN: 0021-9568  
 AU Kang, Yun Whan; Lee, Young Yong  
 PY 1997  
 AB Isothermal vapor-liq. equil. for the three binary systems 1-chloro-1,1-difluoroethane + hydrogen fluoride, 1,1-dichloro-1-fluoroethane + hydrogen fluoride, and chlorodifluoromethane + hydrogen fluoride were measured. The exptl. data for the binary systems are correlated with the NRTL equation with the vapor-phase assocn. model for the mixts. contg. hydrogen fluoride, and the relevant parameters are presented. All of the systems form min. boiling heterogeneous azeotropes.

L11 ANSWER 10 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1997:124390 HCAPLUS  
 DN 126:131180  
 TI Gas-phase process for the manufacture of **difluoromethane** from **dichloromethane** and **hydrogen fluoride** in the presence of chlorine  
 SO Eur. Pat. Appl., 8 pp.  
 CODEN: EPXXDW  
 IN Requieme, Benoit; Perdrieux, Sylvain; Cheminal, Bernard; Lacroix, Eric; Lantz, Andre  
 PI EP 751108 A1 970102  
 AI EP 96-401151 960529  
 PY 1997  
 AB CH<sub>2</sub>F<sub>2</sub> is manufd. from CH<sub>2</sub>C<sub>12</sub> by a catalytic gas-phase fluorination using anhyd. HF in the presence of Cl<sub>2</sub>. AlF<sub>3</sub> on a Cr-Ni support is used as the fluorination catalyst and the presence of Cl<sub>2</sub> in the reaction mixt. serves to increase the catalyst's fluorination lifetime.  
 IT 75-10-5P, **Difluoromethane**  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (gas-phase process for the manuf. of **difluoromethane** from **dichloromethane** and **hydrogen fluoride** in the presence of chlorine)  
 IT 75-09-2, **Dichloromethane**, reactions  
 7664-39-3, **Hydrogen fluoride**, reactions  
 RL: RCT (Reactant)  
 (gas-phase process for the manuf. of **difluoromethane** from **dichloromethane** and **hydrogen fluoride** in the presence of chlorine)

L11 ANSWER 11 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1997:35573 HCAPLUS  
 DN 126:76464  
 TI Mechanistic study of the selective hydrogenolysis of CC<sub>12</sub>F<sub>2</sub> (CFC-12) to CH<sub>2</sub>F<sub>2</sub> (HCF-32) over palladium on activated carbon  
 SO Recl. Trav. Chim. Pays-Bas (1996), 115(11/12), 505-510  
 CODEN: RTCPA3; ISSN: 0165-0513  
 AU van de Sandt, Emile J. A. X.; Wiersma, Andre; Makkee, Michiel; van Bekkum, Hermann; Moulijn, Jacob A.

PY 1996  
 AB The influence of temp. (400-560K), H<sub>2</sub>/CCl<sub>2</sub>F<sub>2</sub> ratio (2.2-20), and wt. hourly space velocity (0.3-1.0 g/g.h) on the hydrogenolysis of CCl<sub>2</sub>F<sub>2</sub> to CH<sub>2</sub>F<sub>2</sub> over Pd/C was investigated. The catalyst shows a remarkably high selectivity to CH<sub>2</sub>F<sub>2</sub> (70-90 mol%) at all conversion levels in a broad range of process conditions. A mechanism is proposed in which the reaction proceeds mainly via parallel reaction pathways. The postulated mechanism is supported by thermodyn. data.

L11 ANSWER 12 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1996:616394 HCAPLUS  
 DN 125:247197  
 TI Process and catalysts for the preparation of **difluoromethane**  
**hydrogen fluoride** and **dichloromethane**  
 SO Eur. Pat. Appl., 5 pp.  
 CODEN: EPXXDW  
 IN Wilmet, Vincent; Janssens, Francine  
 PI EP 732314 A1 960918  
 AI EP 96-200591 960305  
 PY 1996  
 AB **Difluoromethane** is prep'd. in high yield and purity by the reaction of **hydrogen fluoride** and **dichloromethane** in the presence of a metal halide catalyst (e.g., SnCl<sub>4</sub>).  
 IT 75-10-5P, **Difluoromethane**  
 RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)  
 (process and catalysts for the prepn. of **difluoromethane**  
**hydrogen fluoride** and **dichloromethane**  
 )  
 IT 75-09-2, **Dichloromethane**, reactions  
 7664-39-3, **Hydrogen fluoride**, reactions  
 RL: RCT (Reactant)  
 (process and catalysts for the prepn. of **difluoromethane**  
**hydrogen fluoride** and **dichloromethane**  
 )

L11 ANSWER 13 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1996:611391 HCAPLUS  
 DN 125:279125  
 TI Process development for the selective hydrogenolysis of CCl<sub>2</sub>F<sub>2</sub> (CFC-12) into CH<sub>2</sub>F<sub>2</sub> (HFC-32)  
 SO Stud. Surf. Sci. Catal. (1996), 101(Pt. A, 11th International Congress on Catalysis--40th Anniversary, 1996, Pt. A), 369-378  
 CODEN: SSCTDM; ISSN: 0167-2991  
 AU Wiersma, A.; Van de Sandt, E. J. A. X.; Makkee, M.; Van Bekkum, H.; Moulijn, J. A.  
 PY 1996  
 AB Pd on activated carbon is an efficient and stable catalyst for hydrogenolysis of CCl<sub>2</sub>F<sub>2</sub> to CH<sub>2</sub>F<sub>2</sub>. The performance and stability of the catalyst strongly depend on the H<sub>2</sub> to CCl<sub>2</sub>F<sub>2</sub> feed ratio. At low feed ratios coke deposition causes deactivation, but at high ratios sintering of Pd causes deactivation. The reaction follows parallel pathways. An ideal process for the hydrogenolysis includes a multi-tube fixed bed reactor with hydrogen recycle in which a limited amt. of methane is allowed.

L11 ANSWER 14 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1996:483534 HCAPLUS  
 DN 125:118017  
 TI Supported palladium-platinum hydrogenation catalyst and its use in the manufacture of hydrofluorocarbons  
 SO PCT Int. Appl., 16 pp.  
 CODEN: PIXXD2  
 IN Scott, John David; Goodyear, Gary; McCarthy, John Charles  
 PI WO 9617683 A1 960613

AI WO 95-GB2837 951206  
 PY 1996  
 AB Title catalyst having improved activity and selectivity comprises Pd and Pt at 2:1 to 500:1 wt. ratio carried on a support such as carbon and is used in the prodn. of a **hydrofluorocarbon** such as **difluoromethane** (I) by contacting a (hydro)  
**halofluorocarbon** such as **chlorodifluoromethane** (II) or **dichlorodifluoromethane**, preferably in a vapor phase, with hydrogen at elevated temp. in the presence of the catalysts. Thus, mixed metal chlorides in HCl were supported on carbon (surface area 800 m<sup>2</sup>/g, particle size 1.0-1.2 mm, 10% Pd, 1.8% Pt) giving a Pt-promoted Pd catalyst which showed II conversion 99.9% and I selectivity 91.3% at 380.degree..

L11 ANSWER 15 OF 40 HCPLUS COPYRIGHT 1998 ACS  
 AN 1996:431554 HCPLUS  
 DN 125:86173  
 TI Method for production of difluoromethane  
 SO Russ.  
 From: Izobreteniya 1995, (36), 209.  
 CODEN: RUXXE7  
 IN Vinogradov, Dmitrij V.; Khomutov, Vladimir A.; Barabanov, Valerij G.  
 PI RU 2051140 C1 951227  
 AI RU 93-93028401 930525  
 PY 1995  
 AB CH<sub>2</sub>F<sub>2</sub> is prep'd. by fluorination of CH<sub>2</sub>Cl<sub>2</sub> with HF at 70-150.degree., using a catalyst contg. 79-96 wt.% SbCl<sub>5</sub>, and the remainder KF, KF.HF, NaF, NaF.HF, NH<sub>4</sub>F, NH<sub>4</sub>F.HF, and/or CsF.HF, at a catalyst concn. of 40-85 wt.% (esp. 54.75 wt.%) vs. the mixt. of catalyst and CH<sub>2</sub>Cl<sub>2</sub>.  
 IT 7664-39-3, **Hydrogen fluoride**, reactions  
 RL: RCT (Reactant)  
 (manuf. of **difluoromethane** by fluorination of **dichloromethane**)

L11 ANSWER 16 OF 40 HCPLUS COPYRIGHT 1998 ACS  
 AN 1996:256085 HCPLUS  
 DN 124:288753  
 TI Process for producing difluoromethane  
 SO PCT Int. Appl., 16 pp.  
 CODEN: PIXXD2  
 IN Yamada, Yasufu; Shibanuma, Takashi; Tsuda, Takehide  
 PI WO 9601241 A1 960118  
 AI WO 95-JP1320 950703  
 PY 1996  
 AB This patent application describes a process for producing **difluoromethane** by the reaction of **dichloromethane** with **hydrogen fluoride** in the presence of a catalyst in a liq. phase economically and safely, wherein the reaction is conducted by using antimony pentafluoride or a mixt. thereof with antimony trifluoride as the catalyst at a temp. of 80-150.degree.C under a pressure of 8-80 kg/cm<sup>2</sup>.

L11 ANSWER 17 OF 40 HCPLUS COPYRIGHT 1998 ACS  
 AN 1996:214765 HCPLUS  
 DN 124:260354  
 TI Method of converting dichlorodifluoromethane into chlorodifluoromethane and other chlorofluoromethanes  
 SO U.S.S.R.  
 From: Izobreteniya 1993, (24), 54.  
 CODEN: URXXAF  
 IN Barabanov, Valerij G.; Datsevich, Leonid B.; Eremeeva, Elena L.; Kalinin, Andrej Yu.; Kramerova, Galina E.; Lyubimova, Marina V.; Nagrodskij, Mikhail I.; Orlov, Georgij D.; Ryleev, Gennadij I.  
 PI SU 1824386 A1 930630  
 AI SU 91-4939388 910527

PY 1993  
 AB CF<sub>2</sub>C<sub>12</sub> is converted into CHF<sub>2</sub>C<sub>1</sub> and other chlorofluoromethanes by reaction with H<sub>2</sub> [resp. mol ratio 4:(1-20)] in the gas phase at 220-250.degree. and 20-40 atm, using a 0.05-1% Pt/C catalyst.

L11 ANSWER 18 OF 40 HCPLUS COPYRIGHT 1998 ACS  
 AN 1996:201270 HCPLUS  
 DN 124:342345  
 TI A study on the hydrodechlorination reaction of dichlorodifluoromethane over Pd/AlF<sub>3</sub> catalyst  
 SO J. Mol. Catal. A: Chem. (1996), 106(1-2), 83-91  
 CODEN: JMCCF2; ISSN: 1381-1169  
 AU Ahn, Byoung Sung; Lee, Sang Cheol; Moon, Dong Ju; Lee, Byung Gwon  
 PY 1996  
 AB The hydrodechlorination reaction of dichlorodifluoromethane (CF<sub>2</sub>C<sub>12</sub>) has been studied under an atm. pressure at 130-210.degree. over Pd/AlF<sub>3</sub> catalyst. The effects of various reaction conditions on the catalyst performance in terms of the reaction rate and product distributions were extensively investigated and the adsorption behaviors of H<sub>2</sub>, CF<sub>2</sub>C<sub>12</sub>, CHF<sub>2</sub>C<sub>1</sub>, CH<sub>2</sub>F<sub>2</sub> and CH<sub>3</sub>F on the catalyst surface are compared. In addn., the plausible reaction scheme has been proposed based on the exptl. observations. Under the assumption that the formation of two main products, CH<sub>2</sub>F<sub>2</sub> and CH<sub>4</sub>, proceeds through the hydrogenation of intermediate species, CF<sub>2</sub>, the reaction rate consts. have been calcd. by fitting the exptl. data with the reaction rate expression.

IT 75-10-5P, Difluoromethane  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (hydrodechlorination of dichlorodifluoromethane over Pd/AlF<sub>3</sub> catalyst)

L11 ANSWER 19 OF 40 HCPLUS COPYRIGHT 1998 ACS  
 AN 1996:194711 HCPLUS  
 DN 124:231839  
 TI Process for producing difluoromethane  
 SO PCT Int. Appl., 15 pp.  
 CODEN: PIXXD2  
 IN Tsuda, Takehide; Yamada, Yasufu; Shibanuma, Takashi  
 PI WO 9535271 A1 951228  
 AI WO 95-JP1122 950607  
 PY 1995  
 AB This patent application describes a process for producing difluoromethane by fluorinating dichloromethane with hydrogen fluoride in a liq. phase in the presence of a fluorination catalyst under such conditions that the reaction is conducted under an abs. pressure of 1-10 kg/cm<sup>2</sup> at a temp. in the range of 50 to 150.degree.C and the selected reaction temp. is a temp. at which hydrogen fluoride is not liquefied under the above-specified pressure. The above conditions serve to attain an extremely high conversion of dichloromethane and hydrogen fluoride and to minimize the amts. of byproducts other than R30 by recycling unreacted starting materials, typically at most 0.1% based on difluoromethane. Furthermore, the corrosion of the reactor scarcely occurs in the reaction of a highly corrosive antimony chloride fluoride with hydrogen fluoride, as long as the above conditions are kept.

L11 ANSWER 20 OF 40 HCPLUS COPYRIGHT 1998 ACS  
 AN 1996:191614 HCPLUS  
 DN 124:342628  
 TI Method for the preparation of difluoromethane  
 SO U.S., 6 pp.  
 CODEN: USXXAM  
 IN Nam, Kyung H.; Na, Doo C.; Kim, Dae S.  
 PI US 5495057 A 960227



AI US 95-398965 950302

PY 1996

AB A method for the prepn. of CH<sub>2</sub>F<sub>2</sub> is disclosed, wherein CH<sub>2</sub>Cl<sub>2</sub> reacts with HF in the liq. phase, at 70.degree.-90.degree. and approx. 11-12 kg/cm<sup>2</sup>G, in the presence of SbCl<sub>5</sub> catalyst. It is important that the concn. of pentavalent Sb is maintained at a level of 85% or more, with the feed mole ratio of HF to CH<sub>2</sub>Cl<sub>2</sub> ranging from about 2.0 to 2.3. Applicable to industrial scale, the method is operated in a batch or continuous system. In addn., it exhibits superior conversion and prodn. yield. In an example with a mol ratio SbCl<sub>5</sub>/CH<sub>2</sub>Cl<sub>2</sub> of 0.17/1 and HF/CH<sub>2</sub>Cl<sub>2</sub> of 2.0/1, the conversion rates of CH<sub>2</sub>Cl<sub>2</sub> and HF were 93.6% and 86.92% by wt., and the product contained 93.52% CH<sub>2</sub>F<sub>2</sub> and 6.48% CH<sub>2</sub>ClF.

IT 75-09-2, Methylene chloride, reactions

RL: RCT (Reactant)

(prep. difluoromethane by fluorination of methylene chloride using hydrogen fluoride and antimony pentachloride catalyst)

L11 ANSWER 21 OF 40 HCPLUS COPYRIGHT 1998 ACS

AN 1996:42622 HCPLUS

DN 124:120721

TI Performance of a rectification column on the reactor in the liquid-phase synthesis of difluoromethane

SO Zh. Prikl. Khim. (S.-Peterburg) (1995), 68(8), 1395-7  
CODEN: ZPKHAB; ISSN: 0044-4618

AU Vinogradov, D. V.; Barabanov, V. G.; Khomutov, V. A.

PY 1995

AB The NRTL correlation equil. parameters for binary systems are derived to calc. the performance of a distn. column installed in the reactor for a liq.-phase CH<sub>2</sub>F<sub>2</sub> synthesis. Vapor-liq. equil. for CH<sub>2</sub>F<sub>2</sub>-HF and ClFCH<sub>2</sub>-HF systems was studied exptl. at 10.degree.. The exptl. data were used to calc. the parameters of the column installed in the reactor.

L11 ANSWER 22 OF 40 HCPLUS COPYRIGHT 1998 ACS

AN 1995:994879 HCPLUS

DN 124:86351

TI Process for converting chlorodifluoromethane and dichlorodifluoromethane

SO PCT Int. Appl., 24 pp.

CODEN: PIXXD2

IN Manogue, William H.; Noelke, Charles J.; Swearingen, Steven H.

PI WO 9524369 A1 950914

AI WO 95-US1518 950216

PY 1995

AB A process is disclosed for the conversion of halogenated methanes of the formula: CCl<sub>y</sub>H<sub>2-y</sub>F<sub>2</sub> (wherein y is 1 or 2) to a mixt. of conversion products. The process involves reacting certain halogenated hydrocarbon feeds and hydrogen (wherein said halogenated methanes are at least one mole percent of the halogenated hydrocarbon feed) in a reaction vessel of alumina, silicon carbide or at least one metal selected from gold, chromium, aluminum, molybdenum, titanium, nickel, iron, cobalt, and their alloys at a temp. of from about 500.degree.C to 800.degree.C and a pressure from about 101 kPa to 7000 kPa to produce a mixt. of conversion products of said halogenated methanes which comprises at least 5 mol percent C<sub>2</sub>H<sub>2</sub>F<sub>4</sub>, wherein the mole ratio of CH<sub>2</sub>FCF<sub>3</sub> to CH<sub>2</sub>CHF<sub>2</sub> in said C<sub>2</sub>H<sub>2</sub>F<sub>4</sub> is at least about 1:9.

L11 ANSWER 23 OF 40 HCPLUS COPYRIGHT 1998 ACS

AN 1995:713958 HCPLUS

DN 123:86591

TI Hydrogen fluoride-fluorination process and trivalent chromium catalysts for the production of difluoromethane and azeotropes of dihalomethanes

containing chlorine from **dichloromethane**  
 SO PCT Int. Appl., 26 pp.  
 CODEN: PIXXD2  
 IN Furmanek, Paul S.; Glasscock, David A.; Keane, Michael, Jr.; Mahler,  
 Barry A.; Rao, Velliyur Nott Mallikarjuna  
 PI WO 9512563 A1 950511  
 AI WO 94-US12473 941031  
 PY 1995  
 AB Difluoromethane is prepd. by contacting a gaseous mixt. contg. CH<sub>2</sub>Cl<sub>2</sub> and HF with a catalyst contg. a trivalent chromium compd. (e.g., CrCl<sub>3</sub>, fluorided CrCl<sub>3</sub>, etc.) supported on C (having an ash content of <0.5 %) at 180-375.degree.. The catalyst and temp. conditions of this process allow the concurrent reaction CC<sub>13</sub>CF<sub>3</sub> with HF to form CC<sub>12</sub>FCF<sub>3</sub>. CH<sub>2</sub>ClF and unreacted CH<sub>2</sub>Cl<sub>2</sub>, each of which may be recovered as an azeotrope with HF, may be recycled.

IT 75-10-5P, **Difluoromethane**  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (hydrogen fluoride-fluorination process and  
 trivalent chromium catalysts for the prodn. of  
**difluoromethane** and azeotropes of **dihalomethanes**  
 contg. chlorine from **dichloromethane**)  
 IT 75-09-2, **Dichloromethane**, reactions  
 7664-39-3, **Hydrogen fluoride**, reactions  
 RL: RCT (Reactant)  
 (hydrogen fluoride-fluorination process and  
 trivalent chromium catalysts for the prodn. of  
**difluoromethane** and azeotropes of **dihalomethanes**  
 contg. chlorine from **dichloromethane**)

L11 ANSWER 24 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1995:667043 HCAPLUS  
 DN 123:35762  
 TI Effect of the Metal-Support Interaction on the Catalytic Properties of Palladium for the Conversion of Difluorodichloromethane with Hydrogen: Comparison of Oxides and Fluorides as Supports  
 SO J. Phys. Chem. (1995), 99(28), 11159-66  
 CODEN: JPCHAX; ISSN: 0022-3654  
 AU Coq, Bernard; Figueras, Francois; Hub, Serge; Tournigant, Didier  
 PY 1995  
 AB The reaction of CF<sub>2</sub>Cl<sub>2</sub> with hydrogen has been studied between 433 and 523 K and atm. pressure, over Pd catalysts supported on graphite and oxides or fluorides of Al, Ti, and Zr. In CF<sub>2</sub>Cl<sub>2</sub> hydrogenation, CH<sub>2</sub>F<sub>2</sub> and CH<sub>4</sub> represented >95% of the products. The catalytic properties of fluoride supported catalysts did not undergo any change as a function of time. In contrast, Pd supported on oxides showed changes in selectivity during the first hours on stream. This was ascribed to the reaction of the oxide support with HF released during the reaction. Alumina and titania were nearly completely converted to the corresponding fluorides, but not zirconia. The selectivity to the desired product CH<sub>2</sub>F<sub>2</sub> was 56% for Pd/graphite and reached 90% for Pd/ZrF<sub>4</sub>. The kinetic study suggested that the selectivity was controlled by the bond strength between a carbene-like species CF<sub>2</sub> and the surface. The strength of this interaction is supposed to vary with electron availability at the Pd surface, and this hypothesis was then investigated by IR spectroscopy using the adsorption of CO on Pd/Al<sub>2</sub>O<sub>3</sub> and Pd/AlF<sub>3</sub>. The morphol. of the Pd particles was little affected by the support and that AlF<sub>3</sub>-supported Pd becomes electron deficient, due to the strong Lewis acidity of the support. This effect is mainly a short-range effect which is better induced by supports made up of a mixt. of fluorides, oxyfluorides, and hydroxyfluorides, rather than pure fluorides. Catalytic properties similar to those of Pd/AlF<sub>3</sub> and ZrF<sub>4</sub> can be simulated with Pd/graphite samples promoted with small amts. of aluminum or zirconium.  
 IT 75-10-5P, **Difluoromethane**  
 RL: IMF (Industrial manufacture); PREP (Preparation)

(metal-support interaction in **difluorodichloromethane**  
**hydrogenation** catalyzed by oxide or fluoride-supported  
 palladium)

L11 ANSWER 25 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1995:453483 HCAPLUS  
 DN 122:293893  
 TI Manufacture of difluoromethane from dichloromethane  
 SO Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF  
 IN Tanaka, Kunitada; Shibanuma, Takashi  
 PI JP 07017882 A2 950120 Heisei  
 AI JP 93-191942 930705  
 PY 1995  
 AB CH<sub>2</sub>F<sub>2</sub> (I) is manufd. by reaction of CH<sub>2</sub>Cl<sub>2</sub> (II) with HF in liq. phase in the presence of SbCl<sub>x</sub>F<sub>y</sub> ( $x + y = 5$ ;  $y = 1-3$ ) catalysts and treating the resulted CH<sub>2</sub>FCl (III) with catalysts in liq. or gas phases or treating with HF in the presence of catalysts in gas phases. Thus, II was treated with HF in the presence of SbCl<sub>2</sub>F<sub>3</sub> (prepd. from SbCl<sub>5</sub> and HF) at 80.degree. under 10 kG pressure. I and HCl followed by HF were removed from the product, and the residual III was passed through Cr oxide at 150.degree. and 80 mL/min to give 35.6 mL/min I.

L11 ANSWER 26 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1995:275367 HCAPLUS  
 DN 122:105240  
 TI Manufacture of difluoromethane  
 SO Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF  
 IN Muramaki, Kazuo; Oono, Hiromoto; Nagayasu, Toshio  
 PI JP 06263658 A2 940920 Heisei  
 AI JP 93-50954 930311  
 PY 1994  
 AB Title compd. (I) is manufd. from dichloromethane and HF by introducing the reaction products of dichloromethane and HF to the first distn. column for sepn. of HCl from the top and a fraction mainly consisting of I, chlorofluoromethane, dichloromethane, and HF from the bottom, introducing the bottom fraction to the second distn. column for withdrawal of a fraction mainly consisting of I from the top, forwarding the fraction to a sep. purifn. step to recover I, mixing the bottom from the second distn. column with dichloroethylene (sic) and HF to adjust the ratio and amt. of the reactants and feeding them to the reactor.

IT 7664-39-3, **Hydrogen fluoride**, reactions  
 RL: RCT (Reactant)  
 (fluorination of **dichloromethane** or  
**difluoromethane**)  
 IT 75-09-2, **Dichloromethane**, reactions  
 RL: RCT (Reactant)  
 (fluorination with **hydrogen fluoride** to  
**difluoromethane**)

L11 ANSWER 27 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1995:275366 HCAPLUS  
 DN 122:105239  
 TI Manufacture of difluoromethane  
 SO Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF  
 IN Muramaki, Kazuo; Oono, Hiromoto; Nagayasu, Toshio  
 PI JP 06263657 A2 940920 Heisei  
 AI JP 93-50953 930311  
 PY 1994  
 AB Title compd. (I) is manufd. from dichloromethane and HF by introducing the reaction products of dichloromethane and HF to the first distn. column for sepn. of a main fraction contg. I and HCl

and a bottom fraction contg. dichloromethane, chlorofluoromethane, and HF, introducing the main fraction to the second distn. column for removal of HCl from the top and withdrawal of a fraction mainly consisting of I from the bottom, forwarding the fraction from the bottom to a sep. purifn. step to recover I, and adding dichloromethane and HF to the bottom fraction from the first distn. column. to adjust the ratio and amt. of the reactants and feeding them to the reactor.

- IT 7664-39-3, **Hydrogen fluoride**, reactions  
 RL: RCT (Reactant)  
 (fluorination of **dichloromethane** to  
**difluoromethane**)  
 IT 75-09-2, **Dichloromethane**, reactions  
 RL: RCT (Reactant)  
 (fluorination with **hydrogen fluoride** to  
**difluoromethane**)

- L11 ANSWER 28 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1994:490741 HCAPLUS  
 DN 121:90741  
 TI The origin and fate of volatile trace components in municipal solid waste landfills  
 SO Waste Manage. Res. (1994), 12(2), 129-39  
 CODEN: WMARD8; ISSN: 0734-242X  
 AU Deipser, Anna; Stegmann, Rainer  
 PY 1994  
 AB The content of readily volatile halogenated hydrocarbons (chlorinated as well as chlorinated/**fluorinated hydrocarbons** (VCCs/CFCs)) and the BTEX arom. substances (C6H6, PhMe, ethylbenzene, and xylene) in municipal solid waste (MSW) was detd. by 2 methods. The emission potential of these substances via the gas and leachate phase was studied during the different biol. degrdn. phases in the landfill.  
**Trichlorofluoromethane** (R11),  
**dichlorodifluoromethane** (R12) and **dichloromethane** (R30) were the dominating halogenated trace substances. In the acid phase, with some VCCs/CFCs the emittance may take place via the water phase. Hexane, C6H6, and PhMe could be detected in all tests. PhMe often occurred in relatively high concns. in MSW. It could be shown that R11 degraded into dichlorofluoromethane.

- L11 ANSWER 29 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1994:298054 HCAPLUS  
 DN 120:298054  
 TI Preparation of hydrogen-containing fluoromethanes  
 SO Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF  
 IN Yoshitake, Masaru; Tatematsu, Shin; Morikawa, Shinsuke  
 PI JP 06001731 A2 940111 Heisei  
 AI JP 92-183134 920617  
 PY 1994  
 AB The title compds. are prep'd. by H redn. of CC12F2 in gas phases in presence of redn. catalysts and .gtoreq.1 compds. chosen from H-contg. chlorofluorocarbons and H-contg. fluorocarbons. CC12F2, CHF2CH3, and H were passed through Pt/activated C at 250.degree. with 60 s contact time to give CHClF2 and CH2F2 with 51% and 20% selectivity, resp., at .apprx.80% conversion.

- L11 ANSWER 30 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1994:167282 HCAPLUS  
 DN 120:167282  
 TI Method for removing hydrogen fluoride from halocarbon mixtures  
 SO PCT Int. Appl., 31 pp.  
 CODEN: PIXXD2  
 IN Tsuda, Takehide; Matsumoto, Takeo; Tanaka, Yoshinori; Komatsu, Satoshi; Koyama, Satoshi

PI WO 9321140 A1 931028  
 AI WO 93-JP455 930409  
 PY 1993  
 AB The method comprises distg. the title mixt. to remove binary azeotropic mixts. composed of HF and R-30, HF and R-31, and HF and R-32 or sepg. the mixt. into an upper liq. rich in HF and a lower liq. poor in HF and distg. the resp. phase in a similar manner.

L11 ANSWER 31 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1993:427687 HCAPLUS  
 DN 119:27687  
 TI Process for production of difluoromethane  
 SO Braz. Pedido PI, 28 pp.  
 CODEN: BPXXDX  
 IN Moore, Geoffrey James; O'Kell, Jenny  
 PI BR 9201323 A 921201  
 AI BR 92-1323 920410  
 PY 1992  
 AB CH<sub>2</sub>F<sub>2</sub> (I) is produced by catalytic hydrogenation of halodifluoromethanes XYCF<sub>2</sub> (X, Y = H, Cl, Br; .gtoreq.1 of X and Y .noteq. H) at elevated temp. For example, H and CHClF<sub>2</sub> were passed over 10% Pd/C at 217.degree. and the product gases were dild. with N and scrubbed to remove acids, giving I and CH<sub>4</sub> as sole products in ratio (gas chromatog.) 8.74:1.65. Numerous addnl. runs explored various catalysts (Pd, Pt, Ru, Rh, NiO, Ni, and Pd-Ni) at various temps., plus the substrate CCl<sub>2</sub>F<sub>2</sub>.

L11 ANSWER 32 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1993:59278 HCAPLUS  
 DN 118:59278  
 TI Production of difluoromethane  
 SO Eur. Pat. Appl., 16 pp.  
 CODEN: EPXXDW  
 IN Moore, Geoffrey James; O'Kell, Jenny  
 PI EP 508660 A1 921014  
AI EP 92-302785 920330  
 PY 1992  
 AB A process for prepn. of title compd. (I) comprises hydrogenation of XYCF<sub>2</sub> (X,Y = H, Cl, Br and at least 1 of X and Y .noteq. H) at elevated temp. in the presence of a hydrogenation catalyst. Thus, hydrogenation of ClF<sub>2</sub>CH (II) at 260.degree. in a tube reactor contg. 8.2% Pd on Norit RX3 extrudate active C catalyst gave 76.6% conversion (by vol.) of II with 74.3% selectivity for I.

L11 ANSWER 33 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1987:578651 HCAPLUS  
 DN 107:178651  
 TI Fluorinated derivatives of tetrachloromethane  
 SO Czech., 4 pp.  
 CODEN: CZXXA9  
 IN Vachta, Jaromir; Grunt, Miloslav; Roh, Zdenek; Mekota, Frantisek; Pacha, Jaroslav; Siler, Jaroslav; Krasl, Karel; Posta, Antonin; Barta, Milen  
 PI CS 237613 B1 870216  
 AI CS 83-1754 830315  
 PY 1987  
 AB Combining the traditional FeCl<sub>3</sub>/C fluorination catalysts with Fe (I) and Cu (II) powders increases the HF conversion of the fluorination process while decreasing the formation of higher-fluorinated products. Passing a 2.1:1 mixt. of HF and CC<sub>14</sub> at 295.degree./0.2 MPa over 1.9 L of C impregnated with 20-30% FeCl<sub>2</sub> and mixed with 40 g Fe and 10 g Cu gave, after 300 h, 94.5% HF conversion and the product contg. CC<sub>14</sub> 0.4, FCCl<sub>3</sub> 4.3, F<sub>2</sub>CCl<sub>2</sub> 94.2, and F<sub>3</sub>CCl 1%, vs. 91.28, 1.4, 7, 90.1, and 1.5, resp., for a parallel fluorination conducted with a control catalyst not contg. I or II powder.

L11 ANSWER 34 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1987:485686 HCAPLUS  
 DN 107:85686  
 TI Highly selective carbon-13 separation by carbon dioxide-laser-induced IRMPD of **dichlorodifluoromethane/hydrogen iodide** and **bromochlorodifluoromethane/hydrogen iodide** mixtures  
 SO Chem. Phys. Lett. (1987), 137(6), 590-5  
 CODEN: CHPLBC; ISSN: 0009-2614  
 AU Ma, Peihua; Sugita, Kyoko; Arai, Shigeyoshi  
 PY 1987  
 AB The CO<sub>2</sub> laser-induced IRMPD (IR multiphoton dissociation) of CF<sub>2</sub>Cl<sub>2</sub>/HI and CF<sub>2</sub>ClBr/HI mixts. produced 13C-enriched CF<sub>2</sub>HCl. In CF<sub>2</sub>Cl<sub>2</sub>/HI mixts., the CF<sub>2</sub>HCl underwent secondary IRMPD in the continuing pulse irradn. at the same waveno. and fluence, yielding CF<sub>2</sub>H<sub>2</sub> with a 13C content of 97%. Because of efficient decomprn. at relatively low fluences, CF<sub>2</sub>ClBr seems to be a promising starting mol. in 2-step 13C enrichment.

L11 ANSWER 35 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1985:176308 HCAPLUS  
 DN 102:176308  
 TI Competition between hydrogen fluoride and hydrogen chloride molecular elimination channels in the infrared multiple-photon decomposition of 1,2-dichloro-1,1-difluoroethane. (II)  
 SO Reza Kagaku Kenkyu (1984), 6, 60-3  
 CODEN: RKAKDK; ISSN: 0558-471X  
 AU Ishikawa, Yoichi; Arai, Shigeyoshi  
 PY 1984  
 AB Time-resolved IR emission study show that the HF and HCl mol. elimination channels compete with each other in the IR multiphoton decomprn. of 1,2-dichloro-1,1-difluoroethane. Theor. calcns. were carried out for the decomprn. using a stochastic trajectory method. The calcd. results described satisfactorily the obsd. fluence dependences of HF and HCl yields in the unimol. decomprn. of highly vibrationally excited parent mols.

L11 ANSWER 36 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1981:592761 HCAPLUS  
 DN 95:192761  
 TI Measurements of the surface tension of four halogenated hydrocarbons, **trichlorofluoromethane**, **dichlorodifluoromethane**, trichlorotrifluoroethane (C<sub>2</sub>C<sub>13</sub>F<sub>3</sub>), and **dichlorotetrafluoroethane** (C<sub>2</sub>C<sub>12</sub>F<sub>4</sub>)  
 SO Int. J. Thermophys. (1981), 2(2), 163-76  
 CODEN: IJTHDY; ISSN: 0195-928X  
 AU Watanabe, K.; Okada, M.  
 PY 1981  
 AB A capillary rise method was used to det. the surface tension of four different kinds of halogenated hydrocarbons (CCl<sub>3</sub>F, CCl<sub>2</sub>F<sub>2</sub>, C<sub>2</sub>C<sub>13</sub>F<sub>3</sub>, C<sub>2</sub>C<sub>12</sub>F<sub>4</sub>). The measurements were performed for coexisting liq. and satd. vapor with max. uncertainty 0.12 mN . m<sup>-1</sup> at temps. from 273 K up to near the crit. point of the resp. substances. Under the same exptl. conditions, two sets of surface tension data were obtained with two different Pyrex glass capillaries having inner radii 0.1536 .+- .0.0004 and 0.1724 .+- .0.0005 mm, resp.; the two sets of data are in agreement within 0.1 mN . m<sup>-1</sup>. The data are represented by van der Waals-type correlations with a std. deviation of 0.10 mN . m<sup>-1</sup> for CC<sub>13</sub>F, 0.04 mN . m<sup>-1</sup> for CC<sub>12</sub>F<sub>2</sub>, 0.08 mN . m<sup>-1</sup> for C<sub>2</sub>C<sub>13</sub>F<sub>3</sub>, and 0.07 mN . m<sup>-1</sup> for C<sub>2</sub>C<sub>12</sub>F<sub>4</sub>, resp.

L11 ANSWER 37 OF 40 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1979:491150 HCAPLUS  
 DN 91:91150  
 TI Fluorination of chlorinated hydrocarbons  
 SO U.S., 4 pp.

CODEN: USXXAM  
 IN Fiske, Tom R.; Baugh, Daniel W., Jr.  
 PI US 4147733 790403  
 AI US 78-908310 780522  
 PY 1979  
 AB Fluorinated lower aliph. chlorinated hydrocarbon were prep'd. in the vapor phase with HF in the presence of steam and a metal (particularly Al, Cr, or Ni) fluoride catalyst at 275-425.degree.. Thus, vaporized 38% aq. HF and CH<sub>2</sub>Cl<sub>2</sub> (1.4:1 molar ratio) were passed through a catalyst bed of Cr-Al fluoride at 400.degree. with 8.8 s residence time to give 11% CH<sub>2</sub>ClF, 47% CH<sub>2</sub>F<sub>2</sub>, and 24% MeCl with 30% CH<sub>2</sub>Cl<sub>2</sub> conversion. CH<sub>2</sub>:CHF and MeCHF<sub>2</sub> were similarly prep'd. from CH<sub>2</sub>:CHCl.

IT 75-10-5P *SPN*  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (prep'n. of, by fluorination of dichloromethane with hydrogen fluoride, catalyst for)

L11 ANSWER 38 OF 40 HCPLUS COPYRIGHT 1998 ACS  
 AN 1975:3609 HCPLUS  
 DN 82:3609  
 TI The kinetics of the reaction of atomic hydrogen with difluorodichloromethane  
 SO St. Rab. Khim. Kaz. Univ. (1973), No. 3, 631-6  
 From: Ref. Zh., Khim. 1974, Abstr. 9B901  
 AU Ksandopulo, G. I.; Mansurov, Z. A.  
 PY 1973  
 AB Unavailable

L11 ANSWER 39 OF 40 HCPLUS COPYRIGHT 1998 ACS  
 AN 1972:103684 HCPLUS  
 DN 76:103684  
 TI Synthesis and formulation of several epinephrine salts as a aerosol dosage form  
 SO J. Pharm. Sci. (1972), 61(2), 219-23  
 CODEN: JPMSAE  
 AU Sciarra, John J.; Patel, Jitendra M.; Kapoor, Amrit L.  
 PY 1972  
 AB Various salts of epinephrine (I) such as the maleate, malate, and fumarate were prep'd. Following the synthesis of these salts, a study of the partition coeff. of these salts in high mol. wt. alcs. such as octyl and hexadecyl alc. and water was carried out, and the results were compared to the partition coeff. of I bitartrate in these same vehicles. The solv. of these new salts in CHCl<sub>3</sub>, CC<sub>14</sub>, and fluorinated hydrocarbons was then detd. Several systems incorporating these new salts were prep'd. and subjected to a preliminary stability study. The partition coeff. of I maleate detd. between octyl alc.-water and hexadecyl alc.-water was higher than the value for I bitartrate, malate, and fumarate. The solv. of I maleate and fumarate in 4 propellants (*dichlorodifluoromethane*, *dichlorotetrafluoroethane*, monochlorodifluoroethane, and *difluoroethane*) was slightly higher than the I bitartrate and malate. As expected, difluoroethane dissolved the highest amt. of I salts as compared to the other propellants studied. I maleate and bitartrate had greater stability than the I malate and fumarate on the basis of the preliminary stability study.

L11 ANSWER 40 OF 40 HCPLUS COPYRIGHT 1998 ACS  
 AN 1970:525651 HCPLUS  
 DN 73:125651  
 TI Pulsed-discharge-initiated chemical lasers. I. Hydrogen fluoride laser emission from *chlorodifluoromethane*, *dichlorofluoromethane*, *trifluoromethane*, and *dichlorodifluoromethane--hydrogen* systems  
 SO J. Chem. Phys. (1970), 53(8), 3383-4

CODEN: JCPSA6  
AU Lin, Ming Chang; Green, William H.  
PY 1970  
AB HF laser emission from CHF<sub>2</sub>Cl, CHFCl<sub>2</sub>, CHF<sub>3</sub>, and CF<sub>2</sub>Cl<sub>2</sub>-H<sub>2</sub> systems was obtained by using a transverse, multiple-arc discharge. Both P21 and P10 transitions lase. The addn. of He enhanced emission from all lines. Addn. of H<sub>2</sub> caused a redn. in P10 transition intensities and an increase in P21 transition intensities. A time delay between P21 and P10 emission suggests that a cascading mechanism is operative. The ready availability of the P10 transitions of HF and narrow pulse widths should make ir fluorescence studies practical.

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1 7664-39-3/B1  
(7664-39-3/RN)  
1 75-10-5/B1  
(75-10-5/RN)  
1 75-09-2/B1  
(75-09-2/RN)  
L12 3 (7664-39-3/B1 OR 75-10-5/B1 OR 75-09-2/B1)

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L12 ANSWER 1 OF 3 REGISTRY COPYRIGHT 1998 ACS  
RN 7664-39-3 REGISTRY  
CN Hydrofluoric acid (8CI, 9CI) (CA INDEX NAME)  
OTHER NAMES:  
CN Alsurf 45

CN Anhydrous hydrofluoric acid  
 CN Antisal 2b  
 CN Fluorhydric acid  
 CN Fluoric acid  
 CN Fluorine hydride (FH)  
 CN Fluorine monohydride  
 CN Hydrofluoric acid gas  
 CN Hydrogen fluoride  
 CN Hydrogen fluoride (HF)  
 CN Hydrogen monofluoride  
 DR 32057-09-3  
 MF F H  
 CI COM  
 LC STN Files: AGRICOLA, ANABSTR, APIPLIT, APIPAT, APIPAT2,  
     BIOBUSINESS, BIOSIS, CA, CABA, CANCERLIT, CAPLUS, CASREACT, CEN,  
     CHEMCATS, CHEMINFORMRX, CHEMLIST, CBNB, CHEMSAFE, CIN, CJACS,  
     CSCHEM, CSNB, DETHERM\*, DIPPR\*, EMBASE, GMELIN\*, HSDB\*, IFICDB,  
     IFIPAT, IFIUDB, IPA, MEDLINE, MRCK\*, MSDS-OHS, NIOSHTIC, PDLCOM\*,  
     PIRA, PNI, PROMT, RTECS\*, TOXLINE, TOXLIT, TRCTHERMO\*, TULSA,  
     ULIDAT, USPATFULL, VTB  
     (\*File contains numerically searchable property data)  
 Other Sources: DSL\*\*, EINECS\*\*, TSCA\*\*  
     (\*\*Enter CHEMLIST File for up-to-date regulatory information)

HF

23255 REFERENCES IN FILE CA (1967 TO DATE)  
 170 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA  
 23287 REFERENCES IN FILE CAPLUS (1967 TO DATE)

REFERENCE 1: 129:117264  
 REFERENCE 2: 129:116778  
 REFERENCE 3: 129:116722  
 REFERENCE 4: 129:116721  
 REFERENCE 5: 129:116246  
 REFERENCE 6: 129:116157  
 REFERENCE 7: 129:116154  
 REFERENCE 8: 129:115039  
 REFERENCE 9: 129:115004  
 REFERENCE 10: 129:114939

L12 ANSWER 2 OF 3 REGISTRY COPYRIGHT 1998 ACS  
 RN 75-10-5 REGISTRY  
 CN Methane, difluoro- (8CI, 9CI) (CA INDEX NAME)  
 OTHER NAMES:  
 CN Difluoromethane  
 CN Ecolo Ace 32  
 CN FC 32  
 CN Freon 32  
 CN Genetron 32  
 CN HFC 32  
 CN Methylene difluoride  
 CN R 32  
 CN R 32 (refrigerant)  
 FS 3D CONCORD

MF C H2 F2

CI COM

LC STN Files: ANABSTR, BEILSTEIN\*, BIOBUSINESS, BIOSIS, CA,  
 CANCERLIT, CAOLD, CAPLUS, CASREACT, CEN, CHEMCATS, CHEMINFORMRX,  
 CHEMLIST, CBNB, CIN, CJACS, CSCHEM, CSNB, DETHERM\*, DIPPR\*,  
 GMELIN\*, HODOC\*, IFICDB, IFIPAT, IFIUDB, MEDLINE, MSDS-OHS,  
 NIOSHTIC, PDLCOM\*, PROMT, RTECS\*, SPECINFO, TOXLINE, TOXLIT,  
 TRCTHERMO\*, ULIDAT, USPATFULL, VTB

(\*File contains numerically searchable property data)

Other Sources: EINECS\*\*, NDSL\*\*, TSCA\*\*

(\*\*Enter CHEMLIST File for up-to-date regulatory information)

F-CH<sub>2</sub>-F

1643 REFERENCES IN FILE CA (1967 TO DATE)  
 5 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA  
 1649 REFERENCES IN FILE CAPLUS (1967 TO DATE)  
 127 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 129:114146

REFERENCE 2: 129:113771

REFERENCE 3: 129:110676

REFERENCE 4: 129:110399

REFERENCE 5: 129:108794

REFERENCE 6: 129:100554

REFERENCE 7: 129:97107

REFERENCE 8: 129:97069

REFERENCE 9: 129:97068

REFERENCE 10: 129:97067

L12 ANSWER 3 OF 3 REGISTRY COPYRIGHT 1998 ACS

RN 75-09-2 REGISTRY

CN Methane, dichloro- (8CI, 9CI) (CA INDEX NAME)

OTHER NAMES:

CN Aerothene MM

CN Dichloromethane

CN F 30

CN F 30 (chlorocarbon)

CN Freon 30

CN HCC 30

CN Khladon 30

CN Metaclen

CN Methane dichloride

CN Methylene chloride

CN Methylene dichloride

CN Narkotil

CN R 30

CN R 30 (refrigerant)

CN Solaesthin

CN Soleana VDA

CN Solmethine

FS 3D CONCORD

MF C H2 Cl2

CI COM

LC STN Files: AGRICOLA, ANABSTR, APILIT, APILIT2, APIPAT, APIPAT2,

BEILSTEIN\*, BIOBUSINESS, BIOSIS, CA, CABA, CANCERLIT, CAOLD,  
 CAPLUS, CASREACT, CEN, CHEMCATS, CHEMINFORMRX, CHEMLIST, CBNB,  
 CHEMSAFE, CIN, CJACS, CSCHEM, CSNB, DETHERM\*, DDFU, DIPPR\*, DRUGU,  
 EMBASE, GMELIN\*, HODOC\*, HSDB\*, IFICDB, IFIPAT, IFIUDB, IPA,  
 MEDLINE, MRCK\*, MSDS-OHS, NAPRALERT, NIOSHTIC, PDLCOM\*, PIRA, PNI,  
 PROMT, RTECS\*, SPECINFO, TOXLINE, TOXLIT, TRCTHERMO\*, TULSA,  
 ULIDAT, USAN, USPATFULL, VTB

(\*File contains numerically searchable property data)

Other Sources: DSL\*\*, EINECS\*\*, TSCA\*\*

(\*\*Enter CHEMLIST File for up-to-date regulatory information)

Cl—CH<sub>2</sub>—Cl

15326 REFERENCES IN FILE CA (1967 TO DATE)  
 68 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA  
 15353 REFERENCES IN FILE CAPLUS (1967 TO DATE)  
 7 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 129:117214

REFERENCE 2: 129:115689

REFERENCE 3: 129:115589

REFERENCE 4: 129:114973

\*

REFERENCE 5: 129:114733

REFERENCE 6: 129:114709

REFERENCE 7: 129:114704

REFERENCE 8: 129:113547

REFERENCE 9: 129:113147

REFERENCE 10: 129:112653

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 FILE LAST UPDATED: 27 Aug 1998 (980827/ED)

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L1      30 SEA FILE=REGISTRY ABB=ON   PLU=ON   CH2CL2/MF
L3      11 SEA FILE=REGISTRY ABB=ON   PLU=ON   CH2F2/MF
L4      10 SEA FILE=REGISTRY ABB=ON   PLU=ON   FH/MF
L5      24252 SEA FILE=HCAPLUS ABB=ON  PLU=ON   L1 OR ?DICHLORO?(5A)?MET
          HANE? OR ?DICHLOROMETHANE?
L6      66904 SEA FILE=HCAPLUS ABB=ON  PLU=ON   L4 OR ?HYDROFLUORO? OR
          HYDRO?(2A)?FLUOR?
L7      5936 SEA FILE=HCAPLUS ABB=ON  PLU=ON   L3 OR ?DIFLUORO?(5A)?MET
          HANE? OR ?DIFLUOROMETHANE?
L8      212 SEA FILE=HCAPLUS ABB=ON  PLU=ON   L5 AND L6 AND L7
L9      42093 SEA FILE=HCAPLUS ABB=ON  PLU=ON   L4 OR ?HYDROFLUORO? OR
          HYDRO?(A)?FLUOR?
L11     40 SEA FILE=HCAPLUS ABB=ON  PLU=ON   L5(L)L9(L)L7
L14     1325 SEA FILE=HCAPLUS ABB=ON  PLU=ON   ?FLUORINATION?(L)CATALYS
          T?
L15     24 SEA FILE=HCAPLUS ABB=ON  PLU=ON   (L14 AND L8) NOT L11

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=> d .caabs 115 1-24

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L15 ANSWER 1 OF 24 HCAPLUS COPYRIGHT 1998 ACS
AN 1998:42358 HCAPLUS
DN 128:101814
TI Fluorination of hydrohalomethanes using
hydrogen fluoride in the presence of Lewis acid
catalysts.
SO PCT Int. Appl., 23 pp.
CODEN: PIXXD2
IN Thenappan, Alagappan; Smith, Addison Miles; McKown, Jeffrey Warren;
Bell, Robert Louis
PI WO 9749655 A1 971231
AI WO 97-US10966 970624
PY 1997
AB Fluorination catalysts comprising Mo(V) halides,
Nb(V) halides, Ta(V) halides, Sn(IV) halides, Ti(IV) halides, and
mixts., are claimed. Thus, CH2Cl2 was autoclaved under 300-400 psig
HF at 120.degree. for 5 h in the presence of NbCl5/SnCl4 to give
CH2CF2 with 99.7% selectivity and 98.8% conversion.
IT 75-10-5P, HFC-32
RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP
(Preparation)
      (fluorination of hydrohalomethanes using
hydrogen fluoride in the presence of Lewis acid
catalysts)
IT 75-09-2, Dichloromethane, reactions
RL: RCT (Reactant)
      (fluorination of hydrohalomethanes using
hydrogen fluoride in the presence of Lewis acid
catalysts)

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L15 ANSWER 2 OF 24 HCAPLUS COPYRIGHT 1998 ACS
AN 1997:496566 HCAPLUS
DN 127:96813
TI Shaped heterogeneous fluorination catalysts and
manufacture of halogenated hydrocarbons with high catalytic activity,
low pressure loss, and long catalyst life
SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF
IN Kanemura, Takashi; Kono, Satoshi; Kitano, Keisuke; Takahashi,

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PI Kazuhiro; Shibanuma, Shun  
 JP 09141105 A2 970603 Heisei  
 AI JP 95-329853 951124  
 PY 1997

AB The (un)supported title catalysts based mainly on Cr, Cr oxide, Cr fluoride, and/or Cr oxyfluoride are hollow cylindrical with outer diam. 2-20 mm, inner/outer diam. ratio 0.1-0.7, and length 0.2-2.0 times the outer diam. Cr hydroxide from Cr nitrate and ammonium hydroxide was mixed with 3% graphite, compression molded (outer diam. 5 mm, inner diam. 2 mm, length 5 mm) and treated with HF-N at 200-360.degree. for 2 h and used as catalyst for reaction of HCFC-133a with HF with HFC-134a yield 12.3%.

IT 75-10-5P, HFC-32

RL: IMF (Industrial manufacture); PREP (Preparation)  
 (shaped heterogeneous **fluorination catalysts**  
 and manuf. of halogenated hydrocabons with high catalytic activity, low pressure loss, and long **catalyst** life)

IT 75-09-2, Dichloromethane, reactions

7664-39-3, Hydrogen fluoride, reactions

RL: RCT (Reactant)  
 (shaped heterogeneous **fluorination catalysts**  
 and manuf. of halogenated hydrocabons with high catalytic activity, low pressure loss, and long **catalyst** life)

L15 ANSWER 3 OF 24 HCPLUS COPYRIGHT 1998 ACS

AN 1997:370767 HCPLUS

DN 127:54976

TI Catalytic **hydrolysis** of dichlorodifluoromethane  
 (CFC-12) on sol-gel-derived titania unmodified and modified with H<sub>2</sub>SO<sub>4</sub>

SO J. Catal. (1997), 168(2), 482-490

CODEN: JCTLA5; ISSN: 0021-9517

AU Fu, Xianzhi; Zeltner, A.; Yang, Qing; Anderson, Marc A.

PY 1997

AB Catalytic **hydrolysis** of dichlorodifluoromethane  
 (CFC-12) in a humid air stream was studied over pure and sulfate-promoted TiO<sub>2</sub> **catalysts** which were prepd. by sol-gel methods. The results showed that complete conversion of CFC-12 on unmodified TiO<sub>2</sub> was achieved at reaction temps. higher than 340.degree. under the reaction conditions employed. The selectivity to CO<sub>2</sub> ([CO<sub>2</sub>]produced/[CFC-12]converted) varied from 0.5 to 0.88 over the range of 250-350.degree. and CC<sub>1</sub>F<sub>3</sub> (CFC-13) was detected as the main byproduct. Surface **fluorination** of the TiO<sub>2</sub> **catalyst** during the reaction improved its activity, induced the formation of the fluorinated byproduct CFC-13, and changed such properties of the **catalyst** as its sp. surface area, pore size distribution, and crystal size. It was found that the catalytic and structural properties of TiO<sub>2</sub> were greatly improved by sulfation. The sulfated TiO<sub>2</sub> (TiO<sub>2</sub>/SO<sub>4</sub><sup>2-</sup>) exhibited excellent reaction activity and selectivity for CFC-12 catalytic decomn. at low reaction temps. (190-250.degree.) while retaining a stable structure. Complete decomn. of CFC-12 with stoichiometric prodn. of CO<sub>2</sub> was obsd. over the TiO<sub>2</sub>/SO<sub>4</sub><sup>2-</sup> **catalyst** at 250.degree. under otherwise identical reaction conditions as used for pure TiO<sub>2</sub>. Results of **catalyst** characterization by x-ray diffraction (XRD), XPS, Fourier transform IR spectroscopy (FTIR), and N<sub>2</sub> sorption anal. indicated that surface sulfate species formed on the sulfated TiO<sub>2</sub>. When compared to unmodified TiO<sub>2</sub>, the sulfated TiO<sub>2</sub> exhibited higher resistance to crystal phase transformation from anatase to rutile, higher resistance to the deleterious effects of **fluorination** of the **catalyst**, and higher sp. surface area. **Fluorination** of the **catalyst** did not improve the activity of sulfated TiO<sub>2</sub>, and no CFC-13 was detected as a byproduct, indicating that fluorine was not involved in the formation of reaction sites over the sulfated TiO<sub>2</sub> **catalysts**

L15 ANSWER 4 OF 24 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1997:370438 HCAPLUS  
 DN 127:8413  
 TI Heterogeneous catalyzed decomposition reactions of **dichlorodifluoromethane** in the presence of water on .gamma.-alumina  
 SO J. Fluorine Chem. (1997), Volume Date 1996-1997, 81(2), 197-204  
 CODEN: JFLCAR; ISSN: 0022-1139  
 AU Kemnitz, E.; Kohne, A.; Lieske, E.  
 PY 1997  
 AB The heterogeneous catalyzed decompn. of CC12F2 (CFC-12) in the presence of water was studied, using .gamma.-alumina as **catalyst**. The catalyzed hydrolysis reaction yields very high conversion degrees of CFC-12 in the 1st reaction stage. For a period of .apprx.3 h there is a remarkable lack of balance between the amt. of liberated HF and HCl owing to the uptake of HF by the oxide solid forming .alpha.-AlF<sub>3</sub>. Only after .apprx.3 h does the heterogeneous solid/gas reaction come to an end and then the HCl and the HF balance is equal. With the increasing fluoride content of the solid phase, the decompn. degree of CFC-12 seems to be higher but this is owing to the formation of CC1F3 (CFC-13), which is nearly stable under the conditions used. Mechanistic explanations are given for the formation of CC1F3 whether by dismutation reactions or owing to **hydrofluorination** reactions of CFC-12. Arguments are given about which mechanism might be the most probable. Mechanistic hypotheses are concluded and discussed with respect to the processes at the **catalyst** surface on the basis of the results.

IT 7664-39-3, **Hydrogen fluoride**, formation (nonpreparative)  
 RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative) (heterogeneous catalyzed decompn. reactions of **dichlorodifluoromethane** in presence of water on .gamma.-alumina)

L15 ANSWER 5 OF 24 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1996:605506 HCAPLUS  
 DN 125:225078  
 TI Process for producing **difluoromethane** and **difluorochloromethane**  
 SO PCT Int. Appl., 18 pp.  
 CODEN: PIXXD2  
 IN Tsuda, Takehide; Shibanuma, Takashi  
 PI WO 9624570 A1 960815  
 AI WO 96-JP264 960208  
 PY 1996  
 AB The process comprises fluorinating **dichloromethane** and **trichloromethane** with HF in a liq. phase in the presence of a **fluorination catalyst** in a reactor at 1-20 kg/cm<sup>2</sup> and 50-150.degree.C, whereby **difluoromethane** and **difluorochloromethane** can be produced in the reactor simultaneously or alternatingly, safely and economically. Under the specified temp. and pressure, the HF exists mainly as a gas and imparts no corrosion to the reactor.

IT 75-10-5P, **Difluoromethane**  
 RL: IMF (Industrial manufacture); PREP (Preparation) (fluorination process for producing **difluoromethane** and **difluorochloromethane**)

IT 75-09-2, **Dichloromethane**, reactions  
 7664-39-3, **Hydrogen fluoride**, reactions  
 RL: RCT (Reactant) (fluorination process for producing **difluoromethane** and **difluorochloromethane**)

L15 ANSWER 6 OF 24 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1996:409749 HCAPLUS  
 DN 125:57895  
 TI **Dehydrofluorination, fluorination, and**  
**decomposition of fluorohydrocarbons with phosphate catalysts**  
 SO Jpn. Kokai Tokkyo Koho, 7 pp.  
 CODEN: JKXXAF  
 IN Takita, Jusaku; Ishihara, Tatsuki; Nakajo, Tetsuo  
 PI JP 08104656 A2 960423 Heisei  
 AI JP 94-243024 941006  
 PY 1996  
 AB Phosphate salt **catalysts** are used in (A)  
**dehydrofluorination** of F-contg. halohydrocarbons, (B) prepn.  
 of satd. fluorohydrocarbons from halohydrocarbons with HF, (C)  
 formation of satd. fluorohydrocarbons from F-contg. halohydrocarbons  
 contg. unsatd. halohydrocarbons and/or Cl- or Br-contg.  
 halohydrocarbons with HF, and (D) decompn. of F-contg.  
 halohydrocarbon with HF. CF<sub>3</sub>Me/H/He were passed through 3 wt.%  
 Ag-contg. Mg<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> (prepn. given) at 450.degree. to give CF<sub>2</sub>:CH<sub>2</sub>  
 with 19.3% conversion and 73% selectivity.

IT 75-10-5P, **Difluoromethane**  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
**(dehydrofluorination, fluorination, and**  
**decompn. of fluorohydrocarbons with phosphate catalysts**  
 )  
 IT 75-09-2, Methylene chloride, reactions 7664-39-3,  
**Hydrofluoric acid, reactions**  
 RL: RCT (Reactant)  
**(dehydrofluorination, fluorination, and**  
**decompn. of fluorohydrocarbons with phosphate catalysts**  
 )

L15 ANSWER 7 OF 24 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1995:947221 HCAPLUS  
 DN 123:339132  
 TI Liquid-phase fluorination of organic compounds in fluoropolymer  
 reactors  
 SO Jpn. Kokai Tokkyo Koho, 3 pp.  
 CODEN: JKXXAF  
 IN Kimura, Masumi; Yokoyama, Takaaki  
 PI JP 07233102 A2 950905 Heisei  
 AI JP 94-24419 940222  
 PY 1995  
 AB Org. compds. are fluorinated in liq. phase using HF by feeding HF  
 and the org. compds. in their gaseous states to a reactor made of  
 fluoropolymers. The reaction may be carried out in the presence of  
Lewis acid catalysts. The method effectively gives products without  
 corrosion of reactors. CH<sub>2</sub>Cl<sub>2</sub>, HF, and Cl were evapd. and fed to a  
 SUS 304 reactor lined with perfluoroalkoxy polymer, where SbCl<sub>5</sub> was  
 placed, at 100.degree. and 5 kg/cm<sup>2</sup>G to give CH<sub>2</sub>F<sub>2</sub> and CH<sub>2</sub>FCl with  
 selectivity 92.9 and 7.1%, resp., at conversion 96.4%. A control  
 reaction using an unlined reactor caused corrosion of 50 mm/yr after  
 a 50 h operation.

IT 75-10-5P, **Difluoromethane**  
 RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP  
 (Preparation)  
 (liq.-phase fluorination of org. compds. by feeding gaseous HF  
 and materials to fluoropolymer reactors)

IT 75-09-2, **Dichloromethane, reactions**  
**7664-39-3, Hydrogen fluoride, reactions**  
 RL: RCT (Reactant)  
 (liq.-phase fluorination of org. compds. by feeding gaseous HF  
 and materials to fluoropolymer reactors)

L15 ANSWER 8 OF 24 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1995:787308 HCAPLUS

DN 123:169227  
 TI Process for producing **difluoromethane** and  
 tetrafluoroethane  
 SO PCT Int. Appl., 32 pp.  
 CODEN: PIXXD2  
 IN Homoto, Yukio; Tanaka, Kunitada; Shibanuma, Takashi; Komatsu,  
 Satoshi; Koyama, Satoshi  
 PI WO 9515937 A1 950615  
 AI WO 94-JP2070 941209  
 PY 1995  
 AB This patent application describes a process for producing  
**difluoromethane** and tetrafluoroethane comprising the steps  
 of: (1) reacting **methylene chloride** and 1,1,2-trichloroethylene with  
**hydrogen fluoride** in a first reactor in a gas  
 phase in the presence of a **fluorination catalyst**  
 and 1,1,1,2-tetrafluoroethane, and (2) reacting 1,1,1-  
**trifluorochloroethane** with **hydrogen**  
**fluoride** in a second reactor in a gas phase in the presence  
 of a **fluorination catalyst**, and supplying a  
 reaction mixt. formed in the second reactor to the first reactor.  
 This process makes it possible to obtain **difluoromethane**  
 with high conversion and high selectivity by **fluorination**  
 of methylene chloride using a large amt. of **hydrogen**  
**fluoride** which is also necessary for producing  
 1,1,1,2-tetrafluoroethane. *LQJW*  
 IT 75-10-5P, **Difluoromethane**  
 RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP  
 (Preparation)  
 (process for producing **difluoromethane** and  
 tetrafluoroethane)  
 IT 75-09-2, Methylene chloride, reactions 7664-39-3,  
**Hydrogen fluoride**, reactions  
 RL: RCT (Reactant)  
 (process for producing **difluoromethane** and  
 tetrafluoroethane)  
 L15 ANSWER 9 OF 24 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1995:589470 HCAPLUS  
 DN 122:323362  
 TI Chromium-based **fluorination catalyst** for  
 manufacture of **hydrofluorocarbons** from halogenated  
**hydrocarbons**  
 SO Eur. Pat. Appl., 17 pp.  
 CODEN: EPXXDW  
 IN Tsuji, Katsuyuki; Nakaji, Tetsuo  
 PI EP 641598 A2 950308  
 AI EP 94-113719 940901  
 PY 1995  
 AB The catalyst is prep'd. by firing a substance contg. Cr(OH)3 in the  
 presence of H at a temp. of 350-500.degree. or by heat-treating the  
 Cr(OH)3 in an inert gas stream at a temp. of 100-600.degree. and  
 then firing the heat-treated compd. in the presence of H at the  
 above temp. to grow cryst. Cr2O3. The catalyst is then fluorinated  
 with HF at 300-500.degree.. Halogenated Cl-4 hydrocarbon are  
 brought into contact with gaseous HF in the presence the catalyst to  
 produce **hydrofluorocabons** (HFC) and  
**hydrochlorofluorocarbon** (HCFC). High yields of HFC's and  
 HCFC's are obtained at relatively low temps. *A yet*  
 IT 7664-39-3, **Hydrogen fluoride**, reactions  
 RL: RCT (Reactant)  
 (chromium-based **fluorination catalyst** for  
 manuf. of **hydrofluorocarbon** from halogenated  
**hydrocarbons**)  
 IT 75-09-2, **Dichloromethane**, reactions  
 RL: RCT (Reactant)  
 (chromium-based **fluorination catalyst** for

manuf. of hydrofluorocarbons from halogenated hydrocarbons)  
 IT 75-10-5P, Difluoromethane  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (chromium-based fluorination catalyst for manuf. of hydrofluorocarbons from halogenated hydrocarbons)

L15 ANSWER 10 OF 24 HCPLUS COPYRIGHT 1998 ACS  
 AN 1995:380352 HCPLUS  
 DN 122:136766  
 TI Fluorination catalyst and fluorination process  
 SO Eur. Pat. Appl., 11 pp.  
 CODEN: EPXXDW  
 IN Tsuji, Katsuyuki; Oshiro, Kimitaka; Nakajo, Tetsuo  
 PI EP 629440 A1 941221  
 AI EP 94-109099 940614  
 PY 1994

AB The catalyst, which is used for fluorination of halogenated hydrocarbons for producing hydrofluorocarbons with high yield, comprises indium, chromium, oxygen and fluorine as essential constituent elements. The catalyst is prep'd. by fluorinating a catalyst precursor comprising indium and chromium elements by bringing it into contact with hydrogen fluoride or a fluorine-contg. halogenated hydrocarbon at 300-500.degree..

IT 75-10-5P, HFC 32  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (fluorination catalyst and fluorination process for prodn. of hydrofluorocarbons)

IT 75-09-2, reactions  
 RL: RCT (Reactant)  
 (fluorination catalyst and fluorination process for prodn. of hydrofluorocarbons)

L15 ANSWER 11 OF 24 HCPLUS COPYRIGHT 1998 ACS  
 AN 1995:245129 HCPLUS  
 DN 122:9439  
 TI Room-temperature catalytic fluorination of C1 and C2 chlorocarbons and chlorohydrocarbons on fluorinated Fe<sub>3</sub>O<sub>4</sub> and Co<sub>3</sub>O<sub>4</sub>  
 SO J. Chem. Soc., Faraday Trans. (1994), 90(23), 3585-90  
 CODEN: JCFTEV; ISSN: 0956-5000

AU Thomson, James  
 PY 1994  
 AB A study of the room-temp. reactions of a series of C1 and C2 chlorohydrocarbon and chlorocarbon substrate mols. with fluorinated iron(II,III) oxide and cobalt(II,III) oxide has been conducted. The results show that fluorinated iron(II,III) oxide exhibits an ability to incorporate fluorine into the following substrates in the order: C<sub>12</sub>C:CC<sub>12</sub> > H<sub>2</sub>C:CC<sub>12</sub> > CH<sub>3</sub>CCl<sub>3</sub> > CHCl<sub>3</sub> > CH<sub>2</sub>Cl<sub>2</sub> > CH<sub>2</sub>ClCCl<sub>3</sub> > CCl<sub>4</sub> > CHCl<sub>2</sub>CHCl<sub>2</sub>. The fluorinated cobalt(II,III) oxide gave the reactivity series CHCl<sub>3</sub> > CCl<sub>4</sub> > H<sub>2</sub>C:CC<sub>12</sub> > CHCl<sub>2</sub>CHCl<sub>2</sub> > CH<sub>2</sub>Cl<sub>2</sub> > CH<sub>3</sub>CCl<sub>3</sub> > CC<sub>12</sub>:CC<sub>12</sub> > CH<sub>2</sub>ClCl<sub>3</sub>. Reactions of C1 chlorohydrocarbon or chlorocarbon probe mols. with fluorinated Fe<sub>3</sub>O<sub>4</sub> gave predominately C1 chlorofluorohydrocarbon and chlorofluorocarbon products, resp., whereas fluorinated cobalt(II,III) oxide produced predominantly C2 chlorofluorohydrocarbon and chlorofluorocarbons. For fluorinated Co<sub>3</sub>O<sub>4</sub>, the distribution of C2 products obtained from C1 chlorohydrocarbon precursor mols. is consistent with the formation of radical intermediates at strong Lewis acid surfaces. C2 chlorohydrocarbons exhibit a fluorine for chlorine (F-for-Cl) exchange reaction through the catalytic dehydrochlorination of the

substrate to the alkenic intermediate. The F-for-Cl exchange process was dependent upon the ability of the substrate material to undergo dehydrochlorination; the inability of a substrate to undergo dehydrochlorination results in the fluorination process proceeding through the formation of chlorocarbon or chlorohydrocarbon radical intermediates.

IT 75-09-2, **Dichloromethane**, reactions

RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process)

(room-temp. catalytic fluorination of C1 and C2 chlorocarbons and chlorohydrocarbons on fluorinated Fe<sub>3</sub>O<sub>4</sub> and Co<sub>3</sub>O<sub>4</sub>)

L15 ANSWER 12 OF 24 HCPLUS COPYRIGHT 1998 ACS

AN 1995:128302 HCPLUS

DN 122:9477

TI Preparation of **difluoromethane** from **dichloromethane**

SO Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

IN Tsuji, Katsuyuki; Kaga, Kazuari; Tomota, Seiichi; Nakajo, Tetsuo; Nakayama, Hidetoshi

PI JP 06211707 A2 940802 Heisei

AI JP 93-5188 930114

PY 1994

AB CH<sub>2</sub>F<sub>2</sub> (I) is prep'd. by **fluorination** of CH<sub>2</sub>Cl<sub>2</sub> (II) by HF in gas phases in presence of **catalysts**, which contain Zn, Cr, O, and F and have 5-50% **fluorination** ratio expressed by [Y/(2X + 3)] .times. 100% (where X = Zn/Cr at. ratio, Y = F/Cr at. ratio) and 0.01-0.6 Zn/Cr at. ratio. A mixt. of Cr(NO<sub>3</sub>)<sub>3</sub>.9H<sub>2</sub>O, Zn(NO<sub>3</sub>)<sub>2</sub>.6H<sub>2</sub>O, and NH<sub>3</sub> in H<sub>2</sub>O was stirred and the resulting slurry was dried, pelletized, heated at 400.degree. for 4 h, and treated with HF at 400.degree. to prep. a **catalyst** contg. Zn 11.8, Cr 52.5, O 23.2, and F 9.5 wt.%. II was fluorinated by HF with the **catalyst** at 180.degree. to give 57.0% I.

IT 75-10-5P, **Difluoromethane**

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)

(prepn. of CH<sub>2</sub>F<sub>2</sub> by **fluorination** of CH<sub>2</sub>Cl<sub>2</sub> by HF with Cr-Zn-F **catalysts**)

IT 75-09-2, **Dichloromethane**, reactions

7664-39-3, **Hydrogen fluoride**, reactions

RL: RCT (Reactant)

(prepn. of CH<sub>2</sub>F<sub>2</sub> by **fluorination** of CH<sub>2</sub>Cl<sub>2</sub> by HF with Cr-Zn-F **catalysts**)

L15 ANSWER 13 OF 24 HCPLUS COPYRIGHT 1998 ACS

AN 1994:680250 HCPLUS

DN 121:280250

TI Preparation of **difluoromethane**

SO PCT Int. Appl., 15 pp.

CODEN: PIXXD2

IN Bonniface, David William; Scott, John David; Watson, Michael John

PI WO 9421579 A1 940929

AI WO 94-GB497 940314

PY 1994

AB CH<sub>2</sub>F<sub>2</sub> was prep'd. by (a) contacting CH<sub>2</sub>Cl<sub>2</sub> with HF in the presence of a **fluorination catalyst** to produce a product stream comprising CH<sub>2</sub>F<sub>2</sub>, CH<sub>2</sub>ClF, and unreacted starting materials and (b) sepg. CH<sub>2</sub>F<sub>2</sub> from the product stream from step (a); sufficient HF is employed in the process such that during step (b) the molar ratio of HF to CH<sub>2</sub>ClF is > or = 100:1. The high ratio of HF to CH<sub>2</sub>ClF mitigates toxicity problems assoc'd. with the latter compd. Thus, a tube reactor contg. Zn/Cr oxide **catalyst** was pretreated with HF at 300.degree. for 24 h; the reactor was cooled to 250.degree., pressurized with 10 bar N, and a 27.1:1 molar ratio of HF:CH<sub>2</sub>Cl<sub>2</sub> was introduced. The product stream was scrubbed

with water to remove HF and HCl leaving a mixt. of CH<sub>2</sub>Cl<sub>2</sub> 1.0, CH<sub>2</sub>ClF 7.1, and CH<sub>2</sub>F<sub>2</sub> 92.0 vol. %.

IT 75-10-5P, **Difluoromethane**

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)

(prepn. of **difluoromethane**)

IT 75-09-2, **Dichloromethane**, reactions

7664-39-3, **Hydrogen fluoride**, reactions

RL: RCT (Reactant)

(prepn. of **difluoromethane**)

L15 ANSWER 14 OF 24 HCPLUS COPYRIGHT 1998 ACS

AN 1994:579090 HCPLUS

DN 121:179090

TI Process for reducing the **fluorine** content of **hydrofluorocarbons** and **hydrohalofluorocarbons**

SO PCT Int. Appl., 23 pp.

CODEN: PIXXD2

IN Manzer, Leo Ernest; Rao, Velliyyur Nott Mallikarjuna; Swearingen, Steven Henry

PI WO 9413609 A1 940623

AI WO 93-US11526 931202

PY 1994

AB The fluorine content of acyclic satd. compds. of formula C<sub>n</sub>F<sub>a</sub>X<sub>b</sub>H<sub>c</sub> [each X = (independently) Cl or Br; n = 1-6; a = 1-13; b = 0-12; c = 1-9; (a+b+c) = (2n+2)] is reduced by reaction with HCl in the vapor phase at an elevated temp. in the presence of a catalyst, the mole ratio of HCl to the acyclic satd. compd. being at least about 1:1. Catalysts include alumina, fluorided alumina, aluminum fluoride, chromium oxide, magnesium fluoride, zinc, others, and various combinations. The method is useful for converting **fluorinated halogenated hydrocarbons** to others in higher com. demand or more useful as precursors, and to avoid disposal problems. For example, a CoCl<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> catalyst was fluorided with HF at 200-450.degree., then used to treat CF<sub>3</sub>CF<sub>2</sub>H with a 2- to 20-fold molar excess of HCl at 200-450.degree. and contact time of 30-60 s. At 450.degree., 20-fold excess HCl, and 30-s contact time, the reaction gave an effluent contg. 5.2% FC<sub>1</sub>C:CCl<sub>2</sub> and 81.9% Cl<sub>2</sub>C:CCl<sub>2</sub>. The latter is a precursor of CF<sub>3</sub>CHCl<sub>2</sub> and/or CF<sub>3</sub>CHClF, the preps. of which generate the above CF<sub>3</sub>CF<sub>2</sub>H as a byproduct.

IT 75-09-2P, HCC 30, preparation

RL: BYP (Byproduct); IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)

(redn. of F content of **hydro(halo)fluorocarbons**

by reaction with hydrogen chloride and catalysts)

L15 ANSWER 15 OF 24 HCPLUS COPYRIGHT 1998 ACS

AN 1994:216698 HCPLUS

DN 120:216698

TI Fluorination of dihalomethane

SO Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

IN Yoshitake, Masaru; Tatematsu, Shin; Morikawa, Shinsuke

PI JP 05339179 A2 931221 Heisei

AI JP 92-179323 920612

PY 1993

AB A dihalomethane and HF are reacted in gas phase under (normal) pressure at 150-550.degree. in the presence of a **fluorination catalyst** comprising at least one metal element selected from Mn and Fe group elements (0.01-20 wt.-%/alumina support) supported on an alumina, a part of its O being replaced by halogens. Besides Mn or Fe group elements, the **fluorination catalyst** addnl. contains at least one metal element selected from alk. earth metals and lanthanide elements. Halomethanes are preferably CH<sub>2</sub>Cl<sub>2</sub>, ClCH<sub>2</sub>F, CH<sub>2</sub>Br<sub>2</sub>,

BrCH2F, and BrCH2Cl. The alumina support has micropore vol. .gt;0.6 mL/g and surface area .gt;150 m<sup>2</sup>/g, and .gt;50% of its micropores have micropore diam. 100-1,000 .ANG.. O is added in the **fluorination** system. This process uses new non-chrome **catalysts** which improve conversion ratio of starting materials and show high selectivity and long-lasting activity. Thus, 1,000 g alumina was dried, fluorinated at 300-450.degree. in a stream of HF/N mixed gas, and then chlorofluorinated at 250-300.degree. in a stream of FCCl<sub>3</sub>/HF mixed gas to give an alumina contg. 12 wt.% F and 1.5 wt.% Cl. The latter alumina was immersed in a soln. of 60 g CoCl<sub>2</sub>.6H<sub>2</sub>O in 2L H<sub>2</sub>O, dried, and activated by treatment with a stream of FCCl<sub>3</sub>/HF/N mixed gas at 250-300.degree. to give a **catalyst**. This **catalyst** (200 mL) was packed in an U-shaped reactor (inner diam. 2.54 cm, length 100 cm) and thereto CH<sub>2</sub>Cl<sub>2</sub>, O, and HF were introduced at 100, 2, and 200 mL/min, resp., and 360.degree. to give ClCH<sub>2</sub>F and CH<sub>2</sub>F<sub>2</sub> with 26 and 73% selectivity, resp., and 72% conversion after 3 days, and 30 and 69% selectivity, resp., and 65% conversion after 65 days. CH<sub>2</sub>F<sub>2</sub> is useful as a foaming agent and a refrigerant, a potential substitute for CFC-12, HCFC-22, and CFC-115.

- IT 7664-39-3, **Hydrogen fluoride**, reactions  
 RL: RCT (Reactant)  
     (**fluorination** by, of methylene chloride)
- IT 75-09-2, Methylene chloride, reactions  
 RL: RCT (Reactant)  
     (**fluorination** of, by **hydrogen fluoride, catalysts** for)
- IT 75-10-5P, **Difluoromethane**  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
     (prepn. of, by **fluorination** of methylene chlorofluoromethane with **hydrogen fluoride, catalysts** for)

- L15 ANSWER 16 OF 24 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1994:163446 HCAPLUS  
 DN 120:163446  
 TI Preparation of **hydrofluoroalkanes**  
 SO PCT Int. Appl., 40 pp.  
 CODEN: PIXXD2  
 IN Powell, Richard Llewellyn; Scott, John David; Shields, Charles John;  
 Bonniface, David William  
 PI WO 9325505 A1 931223  
 AI WO 93-GB1207 930608  
 PY 1993  
 AB The title process comprises co-prodn. of two or more **hydrofluoroalkanes** by contacting an alkene or a halogenated alkane with HF at an elevated temp. in the presence of a **fluorination catalyst** to produce a first **hydrofluoroalkane** and wherein an org. precursor to a second **hydrofluoroalkane** is provided in the process whereby a second **hydrofluoroalkane** is produced in addn. to the first **hydrofluoroalkane**. Thus, CF<sub>3</sub>CH<sub>2</sub>Cl (I) contg. 0.43 vol.% C<sub>2</sub>ClF<sub>4</sub> was supplied to a reactor contg. a chromia **catalyst** at 330.degree. to give a product comprising I 79.36, CF<sub>3</sub>CFH<sub>2</sub> 17.86, and, e.g., C<sub>2</sub>HF<sub>5</sub> 0.43 vol.%.
- IT 75-09-2, Methylene chloride, reactions  
 RL: RCT (Reactant)  
     (**fluorination** of)
- IT 75-10-5P, **Difluoromethane**  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
     (prepn. of, method for)

- L15 ANSWER 17 OF 24 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1993:472238 HCAPLUS  
 DN 119:72238  
 TI Reactivation of chromium **catalysts** for

SO      **fluorination** of halohydrocarbons  
 Jpn. Kokai Tokkyo Koho, 7 pp.  
 CODEN: JKXXAF

IN      Tsuji, Katsuyuki; Tomota, Seiichi; Ooshiro, Kimitaka; Hirayama,  
 Hideji; Nakayama, Hidetoshi

PI      JP 05092141 A2 930416 Heisei

AI      JP 91-126196 910529

PY      1993

AB      The title **catalysts** are reactivated by treatment with oxidizing gases at 150-500.degree. followed by reducing gases at 100-500.degree.. CrCl<sub>3</sub> was supported on activated Al<sub>2</sub>O<sub>3</sub>, calcined at 400.degree. for 3 h under air and at 350.degree. for 3<sup>1/2</sup> h under H<sub>2</sub> and treated with HF to prep. a **catalyst**, which was used in **fluorination** of HCFC 133a by HF at 300.degree. for 300 h. The **catalyst** was reactivated by treatment with air-N mixt. at 350.degree. for 10 h, H-N mixt. at 350.degree. for 2 h, and HF at 330.degree. and used in the **fluorination** again to result in 19.8% HCFC 133a conversion and 98.7% selectivity to give HFC 134a after 5 h, vs. 19.9 and 98.6%, resp., in the 1st reaction.

IT      75-09-2, **Dichloromethane**, reactions  
 RL: RCT (Reactant)  
 (fluorination of, reactivation of chromium catalysts for)

IT      75-10-5P, **Difluoromethane**  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (prepn. of, reactivation of chromium catalysts for)

L15     ANSWER 18 OF 24 HCPLUS COPYRIGHT 1998 ACS  
 AN 1993:427696 HCPLUS  
 DN 119:27696  
 TI Manufacture of **hydrofluorocarbons**  
 SO U.S., 3 pp.  
 CODEN: USXXAM

IN Elsheikh, Maher Y.  
 PI US 5208395 A 930504  
 AI US 92-866772 920406  
 PY 1993

AB      The title process comprises the gas-phase reaction of 1,1-dichloroalkanes (e.g. **dichloromethane** or 1,1-dichloroethane) with **hydrogen fluoride** in the presence of a supported tin tetrachloride catalyst. A tubular reactor was charged with a tin tetrachloride/activated carbon catalyst (117 g contg. 0.0017 mol tin tetrachloride) and the catalyst was activated with hydrofluoric acid. This catalyst was used for the conversion of HFC 150a (1,1-dichloroethane) to HFC 152a (1,1-difluoroethane), a potential foam blowing agent.

IT      75-09-2, R 30, reactions  
 RL: RCT (Reactant)  
 (fluorination of, with **hydrofluoric** acid, tin tetrachloride as **catalyst** for)

IT      75-10-5P, Freon 32  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (prepn. of, by **fluorination** of R 30 with hydrofluoric acid, tin tetrachloride as **catalyst** for)

L15     ANSWER 19 OF 24 HCPLUS COPYRIGHT 1998 ACS  
 AN 1993:21935 HCPLUS  
 DN 118:21935  
 TI Fluorination of halogenated alkanes using transition metal fluorides  
 SO Eur. Pat. Appl., 10 pp.  
 CODEN: EPXXDW

IN Dukat, Wolfgang Willi; Holloway, John Henry; Hope, Eric George;  
 Rieland, Matthias; Townson, Paul John; Powell, Richard Llewellyn  
 PI EP 503792 A1 920916  
 AI EP 92-301531 920224  
 PY 1992

AB Fluorinated alkanes were prep'd. by fluorination of alkyl halides contg. at least one Cl, Br or iodine atom by F in the presence of a transition metal fluoride selected from OsF<sub>6</sub>, IrF<sub>6</sub>, ReF<sub>6</sub>, RuF<sub>5</sub>, etc. Thus, fluorination of CH<sub>2</sub>Cl<sub>2</sub> at -78 to +20.degree. by F in the presence of UF<sub>6</sub> gave CHCl<sub>2</sub>F with 99.9% selectivity.

IT 75-09-2, Methylene chloride, reactions

RL: RCT (Reactant)  
(fluorination of)

IT 7664-39-3P, Hydrogen fluoride,

preparation

RL: FORM (Formation, nonpreparative); PREP (Preparation)  
(formation of, by fluorination of methylene chloride)

IT 75-10-5P, Difluoromethane

RL: SPN (Synthetic preparation); PREP (Preparation)  
(prepn. of, by fluorination of methylene chloride)

L15 ANSWER 20 OF 24 HCPLUS COPYRIGHT 1998 ACS

AN 1993:6616 HCPLUS

DN 118:6616

TI Fluorination of halogenated alkanes using transition metal oxide fluorides

SO Eur. Pat. Appl., 8 pp.

CODEN: EPXXDW

IN Holloway, John Henry; Hope, Eric George; Townson, Paul John; Powell, Richard Llewellyn

PI EP 503793 A1 920916

AI EP 92-301532 920224

PY 1992

AB Fluoroalkanes were prep'd. by fluorination of halogenated alkanes contg. at least one Cl, Br, or iodine atom by F in the presence of a transition metal oxide fluoride. Thus, fluorination of CH<sub>2</sub>Cl<sub>2</sub> by F in the presence of ReOF<sub>4</sub> at -78 to +20.degree. gave CH<sub>2</sub>ClF in 97.5% yield.

IT 75-09-2, Methylene chloride, reactions

RL: RCT (Reactant)  
(fluorination of, by fluorine)

IT 75-10-5P, Difluoromethane

RL: SPN (Synthetic preparation); PREP (Preparation)  
(prepn. of, by fluorination of methylene bromide)

L15 ANSWER 21 OF 24 HCPLUS COPYRIGHT 1998 ACS

AN 1990:615192 HCPLUS

DN 113:215192

TI Preparation of catalysts for synthesis of **fluorine**-containing halogenated **hydrocarbons**

SO Ger. (East), 3 pp.

CODEN: GEXXA8

IN Kemnitz, Erhard; Hass, Dieter; Roennebeck, Matthias; Schmidt, Udo; Kaden, Reinfried; Henke, Christian

PI DD 276431 A1 900228

AI DD 88-321224 881031

PY 1990

AB A method for prepn. of **catalysts** for synthesis of F-contg. halogenated hydrocarbons with Al<sub>2</sub>O<sub>3</sub> as support and Al-F compds. as active components comprises adding .gamma.-Al<sub>2</sub>O<sub>3</sub> to a soln. of ammonium- or alkylammonium fluoride at 290-370 K to ppt. ammonium- or alkylammonium fluoroaluminate. Suitable alkylammonium fluoride includes Me or Et ammonium fluoride. The **catalysts** are esp. useful for **fluorination** of chloroalkanes to low- and intermediately fluorinated compds. with high yields. The compds. obtained are useful as coolants, aerating gases, corrosive gases, and solvents.

L15 ANSWER 22 OF 24 HCPLUS COPYRIGHT 1998 ACS

AN 1990:615191 HCPLUS

DN 113:215191

TI Preparation of catalysts for synthesis of fluorine-containing halogenated hydrocarbons  
 SO Ger. (East), 3 pp.  
 CODEN: GEXXA8  
 IN Kemnitz, Erhard; Hass, Dieter; Roennebeck, Matthias; Schmidt, Udo;  
 Kaden, Reinfried; Henke, Christian  
 PI DD 276430 A1 900228  
 AI DD 88-321223 881031  
 PY 1990  
 AB Catalysts for the synthesis of F-contg. halogenated hydrocarbons with .alpha.-Al<sub>2</sub>O<sub>3</sub> or activated C as support material and Al-F-compds. as active components are prep'd. by adding the support material to a soln. obtained by dissolving Al(OH)<sub>3</sub> in HF for impregnation, and adding NH<sub>3</sub> or alkylamine (e.g., methylamine or ethylamine) to ppt. ammonium- or alkylammonium fluoroaluminate. The catalysts are esp. useful for fluorination of chloroalkanes (e.g., tetrachloromethane) to obtain low- and intermediately fluorinated hydrocarbons which can be used as coolants, aerating gases, corrosive gases, and solvents.  
 IT 7664-39-3, Hydrofluoric acid, uses and miscellaneous  
 RL: USES (Uses)  
 (catalyst prep'n. from, for fluorination of chloroalkanes)

L15 ANSWER 23 OF 24 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1990:101137 HCAPLUS  
 DN 112:101137  
 TI Preparation, characterization, and activity of fluorinated aluminas for halogen exchange  
 SO J. Catal. (1989), 120(2), 387-400  
 CODEN: JCTLA5; ISSN: 0021-9517  
 AU Hegde, R. I.; Barreau, M. A.  
 PY 1989  
 AB Fluorinated aluminas with .alpha.-AlF<sub>3</sub> content  $\leq 90\%$  were prep'd. by treatment with the fluoroalkanes CHF<sub>3</sub> or C<sub>2</sub>HF<sub>5</sub> at 773 K. XPS results suggested that nearly complete fluorination of the surface occurs even at low extents of bulk fluorination. Neither .gamma.-Al<sub>2</sub>O<sub>3</sub> nor .alpha.-AlF<sub>3</sub> exhibited significant activity for reaction of CHF<sub>3</sub> following adsorption at 300 K and subsequent temp.-programmed desorption. In contrast, partially fluorinated aluminas strongly adsorbed CHF<sub>3</sub>, CHClF<sub>2</sub>, and CHCl<sub>2</sub>F. Temp.-programmed desorption expts. indicated that all three compds. desorb from partially fluorinated alumina at >500 K; all reacted to liberate HF and CO<sub>2</sub>, and the chlorine-contg. species underwent fluorine-for-chlorine exchange to produce CHF<sub>3</sub>. These results suggested that such halogen-exchange reactions could be carried out with materials resembling conventional fluorination catalysts.

L15 ANSWER 24 OF 24 HCAPLUS COPYRIGHT 1998 ACS  
 AN 1982:491669 HCAPLUS  
 DN 97:91669  
 TI Catalyst for fluorination of organic chlorocompounds  
 SO Chim. Ind. (Milan) (1982), 64(3), 135-40  
 CODEN: CINMAB; ISSN: 0009-4315  
 AU Marangoni, Luigi; Rasia, Giorgio; Gervasutti, Claudio; Colombo, Luigi  
 PY 1982  
 AB Cr(OH)<sub>3</sub> free of ionic impurities [from NH<sub>4</sub>OH pptn. of dil. KCr(SO<sub>4</sub>)<sub>2</sub>.cndot.12H<sub>2</sub>O] was dried and calcined at 450-550.degrees. to give a long lived fluorination catalyst. The gaseous fluorination of CC<sub>14</sub>, CHCl<sub>3</sub>, CH<sub>2</sub>C<sub>12</sub>, C<sub>2</sub>C<sub>16</sub>, C<sub>2</sub>HC<sub>15</sub>, ClCH:CCl<sub>2</sub>, C<sub>2</sub>C<sub>14</sub>, C<sub>2</sub>C<sub>13</sub>F<sub>3</sub>, C<sub>2</sub>C<sub>12</sub>F<sub>4</sub>, (CC<sub>13</sub>)<sub>2</sub>CO, and CF<sub>3</sub>CH<sub>2</sub>Cl with HF over the catalyst is described.

IT 7664-39-3, reactions  
 RL: RCT (Reactant)  
 (catalytic fluorination of chlorocarbons with)  
 IT 75-09-2, reactions  
 RL: RCT (Reactant)  
 (catalytic **fluorination** of, with **hydrogen fluoride**)  
 IT 75-10-5P  
 RL: SPN (Synthetic preparation); PREP (Preparation) ▲  
 (prepn. of)

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1 75-09-2/BI  
 (75-09-2/RN)  
 1 75-10-5/BI  
 (75-10-5/RN)  
 1 7664-39-3/BI  
 (7664-39-3/RN)  
 L16 3 (75-09-2/BI OR 75-10-5/BI OR 7664-39-3/BI)

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L16 ANSWER 1 OF 3 REGISTRY COPYRIGHT 1998 ACS  
 RN 7664-39-3 REGISTRY  
 CN Hydrofluoric acid (8CI, 9CI) (CA INDEX NAME)  
 OTHER NAMES:  
 CN Alsurf 45  
 CN Anhydrous hydrofluoric acid  
 CN Antisal 2b  
 CN Fluorhydric acid  
 CN Fluoric acid  
 CN Fluorine hydride (FH)  
 CN Fluorine monohydride

CN Hydrofluoric acid gas  
 CN Hydrogen fluoride  
 CN Hydrogen fluoride (HF)  
 CN Hydrogen monofluoride  
 DR 32057-09-3  
 MF F H  
 CI COM  
 LC STN Files: AGRICOLA, ANABSTR, APIAIT, APIAIT2, APIPAT, APIPAT2,  
     BIOBUSINESS, BIOSIS, CA, CABA, CANCERLIT, CAPLUS, CASREACT, CEN,  
     CHEMCATS, CHEMINFORMRX, CHEMLIST, CBNB, CHEMSAFE, CIN, CJACS,  
     CSCHEM, CSNB, DETHERM\*, DIPPR\*, EMBASE, GMELIN\*, HSDB\*, IFICDB,  
     IFIPAT, IFIUDB, IPA, MEDLINE, MRCK\*, MSDS-OHS, NIOSHTIC, PDLCOM\*,  
     PIRA, PNI, PROMT, RTECS\*, TOXLINE, TOXLIT, TRCTHERMO\*, TULSA,  
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HF

23255 REFERENCES IN FILE CA (1967 TO DATE)  
 170 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA  
 23287 REFERENCES IN FILE CAPLUS (1967 TO DATE)

REFERENCE 1: 129:117264  
 REFERENCE 2: 129:116778  
 REFERENCE 3: 129:116722  
 REFERENCE 4: 129:116721  
 REFERENCE 5: 129:116246  
 REFERENCE 6: 129:116157  
 REFERENCE 7: 129:116154  
 REFERENCE 8: 129:115039  
 REFERENCE 9: 129:115004  
 REFERENCE 10: 129:114939

L16 ANSWER 2 OF 3 REGISTRY COPYRIGHT 1998 ACS  
 RN 75-10-5 REGISTRY  
 CN Methane, difluoro- (8CI, 9CI) (CA INDEX NAME)  
 OTHER NAMES:  
 CN Difluoromethane  
 CN Ecolo Ace 32  
 CN FC 32  
 CN Freon 32  
 CN Genetron 32  
 CN HFC 32  
 CN Methylene difluoride  
 CN R 32  
 CN R 32 (refrigerant)  
 FS 3D CONCORD  
 MF C H2 F2  
 CI COM  
 LC STN Files: ANABSTR, BEILSTEIN\*, BIOBUSINESS, BIOSIS, CA,  
     CANCERLIT, CAOLD, CAPLUS, CASREACT, CEN, CHEMCATS, CHEMINFORMRX,  
     CHEMLIST, CBNB, CIN, CJACS, CSCHEM, CSNB, DETHERM\*, DIPPR\*,  
     GMELIN\*, HODOC\*, IFICDB, IFIUDB, MEDLINE, MSDS-OHS,

NIOSHTIC, PDLCOM\*, PROMT, RTECS\*, SPECINFO, TOXLINE, TOXLIT,  
TRCTHERMO\*, ULIDAT, USPATFULL, VTB

(\*File contains numerically searchable property data)

Other Sources: EINECS\*\*, NDSL\*\*, TSCA\*\*

(\*\*Enter CHEMLIST File for up-to-date regulatory information)

F-CH<sub>2</sub>-F

1643 REFERENCES IN FILE CA (1967 TO DATE)

5 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA

1649 REFERENCES IN FILE CAPLUS (1967 TO DATE)

127 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 129:114146

REFERENCE 2: 129:113771

REFERENCE 3: 129:110676

REFERENCE 4: 129:110399

REFERENCE 5: 129:108794

REFERENCE 6: 129:100554

REFERENCE 7: 129:97107

REFERENCE 8: 129:97069

REFERENCE 9: 129:97068

REFERENCE 10: 129:97067

L16 ANSWER 3 OF 3 REGISTRY COPYRIGHT 1998 ACS

RN 75-09-2 REGISTRY

CN Methane, dichloro- (8CI, 9CI) (CA INDEX NAME)

OTHER NAMES:

CN Aerotherene MM

CN Dichloromethane

CN F 30

CN F 30 (chlorocarbon)

CN Freon 30

CN HCC 30

CN Khladon 30

CN Metaclen

CN Methane dichloride

CN Methylene chloride

CN Methylene dichloride

CN Narkotil

CN R 30

CN R 30 (refrigerant)

CN Solaesthin

CN Soleana VDA

CN Solmethine

FS 3D CONCORD

MF C H<sub>2</sub> Cl<sub>2</sub>

CI COM

LC STN Files: AGRICOLA, ANABSTR, APIPLIT, APIPLIT2, APIPAT, APIPAT2,

BEILSTEIN\*, BIOBUSINESS, BIOSIS, CA, CABA, CANCERLIT, CAOLD,

CAPLUS, CASREACT, CEN, CHEMCATS, CHEMINFORMRX, CHEMLIST, CBNB,

CHEMSAFE, CIN, CJACS, CSCHEM, CSNB, DETHERM\*, DDFU, DIPPR\*, DRUGU,

EMBASE, GMELIN\*, HODOC\*, HSDB\*, IFICDB, IFIPAT, IFIUDB, IPA,

MEDLINE, MRCK\*, MSDS-OHS, NAPRALERT, NIOSHTIC, PDLCOM\*, PIRA, PNI,

PROMT, RTECS\*, SPECINFO, TOXLINE, TOXLIT, TRCTHERMO\*, PULSA,

ULIDAT, USAN, USPATFULL, VTB  
(\*File contains numerically searchable property data)  
Other Sources: DSL\*\*, EINECS\*\*, TSCA\*\*  
(\*\*Enter CHEMLIST File for up-to-date regulatory information)

Cl-CH<sub>2</sub>-Cl

15326 REFERENCES IN FILE CA (1967 TO DATE)  
68 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA  
15353 REFERENCES IN FILE CAPLUS (1967 TO DATE)  
7 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 129:117214

REFERENCE 2: 129:115689

REFERENCE 3: 129:115589

REFERENCE 4: 129:114973

REFERENCE 5: 129:114733

REFERENCE 6: 129:114709

REFERENCE 7: 129:114704

REFERENCE 8: 129:113547

REFERENCE 9: 129:113147

REFERENCE 10: 129:112653

=> fil casreact

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FILE CONTENT:1985 - 23 Aug 1998 (VOL 102 ISS 1 - VOL 129 ISS 8

>>> Several important enhancements to CASREACT functional group <<<  
 >>> searching were introduced. Enter HELP FGA or HELP FGC for more <<<  
 >>> information. <<<

This file contains CAS Registry Numbers for easy and accurate substance identification.

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=> d stat que 120

|     |                               |        |                     |
|-----|-------------------------------|--------|---------------------|
| L1  | 30 SEA FILE=REGISTRY ABB=ON   | PLU=ON | CH2CL2/MF           |
| L3  | 11 SEA FILE=REGISTRY ABB=ON   | PLU=ON | CH2F2/MF            |
| L4  | 10 SEA FILE=REGISTRY ABB=ON   | PLU=ON | FH/MF               |
| L17 | 743 SEA FILE=CASREACT ABB=ON  | PLU=ON | L1/RRT              |
| L18 | 32 SEA FILE=CASREACT ABB=ON   | PLU=ON | L3/PRO              |
| L19 | 1480 SEA FILE=CASREACT ABB=ON | PLU=ON | L4/RRT              |
| L20 | 10 SEA FILE=CASREACT ABB=ON   | PLU=ON | L17 AND L18 AND L19 |

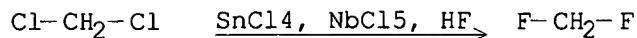
=>

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=> d bib abs crd 1-10

L20 ANSWER 1 OF 10 CASREACT COPYRIGHT 1998 ACS  
 AN 128:101814 CASREACT  
 TI Fluorination of hydrohalomethanes using hydrogen fluoride in the presence of Lewis acid catalysts.  
 IN Thenappan, Alagappan; Smith, Addison Miles; McKown, Jeffrey Warren; Bell, Robert Louis  
 PA Alliedsignal Inc., USA  
 SO PCT Int. Appl., 23 pp.  
 CODEN: PIXXD2  
 PI WO 9749655 A1 971231  
 DS W: JP, KR  
 RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE  
 AI WO 97-US10966 970624  
 PRAI US 96-672005 960624  
 DT Patent  
 LA English  
 AB Fluorination catalysts comprising Mo(V) halides, Nb(V) halides, Ta(V) halides, Sn(IV) halides, Ti(IV) halides, and mixts., are claimed. Thus, CH<sub>2</sub>Cl<sub>2</sub> was autoclaved under 300-400 psig HF at 120.degree. for 5 h in the presence of NbCl<sub>5</sub>/SnCl<sub>4</sub> to give CH<sub>2</sub>CF<sub>2</sub> with 99.7% selectivity and 98.8% conversion.

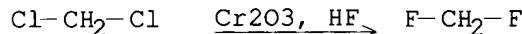
RX(1) OF 1



NOTE: 120.degree., 300-400 psig, 98.8% conversion, 99.7% selectivity

L20 ANSWER 2 OF 10 CASREACT COPYRIGHT 1998 ACS  
 AN 126:263837 CASREACT  
 TI Vapor-phase process and catalysts for the production of difluoromethane from hydrogen fluoride and dichloromethane  
 IN Clemmer, Paul Gene; Smith, Addison Miles; Tung, Hsueh Sung; Bass, John Stephen  
 PA Alliedsignal Inc., USA  
 SO PCT Int. Appl., 14 pp.  
 CODEN: PIXXD2  
 PI WO 9711043 A1 970327  
 DS W: AL, AU, BB, BG, BR, CA, CN, CU, CZ, EE, GE, HU, IL, IS, JP, KP,  
       KR, LK, LR, LT, LV, MG, MK, MN, MW, MX, NO, NZ, PL, RO, SD, SG,  
       SI, SK, TR, TT, UA, UZ, VN, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM  
       RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FI, FR, GA, GB,  
       GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG  
 AI WO 96-US14734 960913  
 PRAI US 95-530649 950920  
 DT Patent  
 LA English  
 AB Difluoromethane (i.e., HFC-32; I) is prep'd. in high yield and selectivity by: (A) preheating a mixt. of HF (II) and Cl<sub>2</sub>CH<sub>2</sub> (III) to form a vaporized and superheater compn.; (B) reacting this superheated compn. in the presence of a fluorination catalyst (e.g., Cr<sub>2</sub>O<sub>3</sub>/Al<sub>2</sub>O<sub>3</sub>) to form a product stream contg. F<sub>2</sub>CH<sub>2</sub>, ClFCH<sub>2</sub> (IV), HCl (V), Cl<sub>2</sub>CH<sub>2</sub>, and HF; (C) distg. the product stream to produce a high-boiling stream comprising II, III, and IV, and a low-boiling stream comprising I, II, and V; and (D) recovering substantially pure I from the low-boiling distn. fraction.

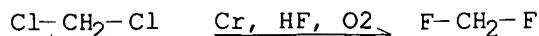
RX(1) OF 1



NOTE: vapor-phase process; catalyst supported on alumina

L20 ANSWER 3 OF 10 CASREACT COPYRIGHT 1998 ACS  
 AN 126:143889 CASREACT  
 TI Catalytic gas-phase fluorination synthesis of difluoromethane from dichloromethane and hydrogen fluoride  
 IN Requieme, Benoit; Lacroix, Eric; Lantz, Andre  
 PA Elf Atochem S.A., Fr.  
 SO Eur. Pat. Appl., 8 pp.  
 CODEN: EPXXDW  
 PI EP 751107 A1 970102  
 DS R: BE, DE, ES, FR, GB, GR, IT, NL  
 AI EP 96-401150 960529  
 PRAI FR 95-7705 950627  
 DT Patent  
 LA French  
 AB CH<sub>2</sub>F<sub>2</sub> is prep'd. by the reaction of CH<sub>2</sub>Cl<sub>2</sub> (I) with anhyd. HF in the presence of 0.1-5 mol O<sub>2</sub> per 100 mol of I at 330-450.degree. in the presence of an optionally supported Cr catalyst.

RX(1) OF 1



NOTE: gas-phase process

L20 ANSWER 4 OF 10 CASREACT COPYRIGHT 1998 ACS

AN 125:247197 CASREACT

TI Process and catalysts for the preparation of difluoromethane hydrogen fluoride and dichloromethane

IN Wilmet, Vincent; Janssens, Francine

PA Solvay et Cie., Belg.

SO Eur. Pat. Appl., 5 pp.

CODEN: EPXXDW

PI EP 732314 A1 960918

DS R: DE, ES, FR, GB, IT, NL

AI EP 96-200591 960305

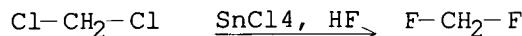
PRAI FR 95-3185 950316

DT Patent

LA French

AB Difluoromethane is prepd. in high yield and purity by the reaction of hydrogen fluoride and dichloromethane in the presence of a metal halide catalyst (e.g., SnCl4).

RX(1) OF 1



L20 ANSWER 5 OF 10 CASREACT COPYRIGHT 1998 ACS

AN 124:342628 CASREACT

TI Method for the preparation of difluoromethane

IN Nam, Kyung H.; Na, Doo C.; Kim, Dae S.

PA Ulsan Chemical Co., Ltd., S. Korea

SO U.S., 6 pp.

CODEN: USXXAM

PI US 5495057 A 960227

AI US 95-398965 950302

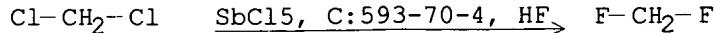
PRAI KR 94-38154 941228

DT Patent

LA English

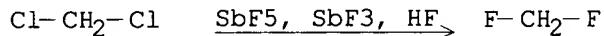
AB A method for the prepn. of CH2F2 is disclosed, wherein CH2Cl2 reacts with HF in the liq. phase, at 70.degree.-90.degree. and approx. 11-12 kg/cm<sup>2</sup>G, in the presence of SbCl5 catalyst. It is important that the concn. of pentavalent Sb is maintained at a level of 85% or more, with the feed mole ratio of HF to CH2Cl2 ranging from about 2.0 to 2.3. Applicable to industrial scale, the method is operated in a batch or continuous system. In addn., it exhibits superior conversion and prodn. yield. In an example with a mol ratio SbCl5/CH2Cl2 of 0.17/1 and HF/CH2Cl2 of 2.0/1, the conversion rates of CH2Cl2 and HF were 93.6% and 86.92% by wt., and the product contained 93.52% CH2F2 and 6.48% CH2ClF.

RX(1) OF 1

NOTE: 70-90.degree. and 11-12 kg/cm<sup>2</sup>G, mol ratio HF/CH2Cl2 = 2.0-2.3, 91.7-93.6% conversion of CH2Cl2, product ratio CH2F2/CH2FC1 = (93.52-86.35%)/(6.48-13.65%)

L20 ANSWER 6 OF 10 CASREACT COPYRIGHT 1998 ACS  
 AN 124:288753 CASREACT  
 TI Process for producing difluoromethane  
 IN Yamada, Yasufu; Shibanuma, Takashi; Tsuda, Takehide  
 PA Daikin Industries Ltd., Japan  
 SO PCT Int. Appl., 16 pp.  
 CODEN: PIXXD2  
 PI WO 9601241 A1 960118  
 DS W: AU, BR, CA, CN, JP, KR, RU, US  
 RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE  
 AI WO 95-JP1320 950703  
 PRAI JP 94-151151 940701  
 DT Patent  
 LA Japanese  
 AB This patent application describes a process for producing difluoromethane by the reaction of dichloromethane with hydrogen fluoride in the presence of a catalyst in a liq. phase economically and safely, wherein the reaction is conducted by using antimony pentafluoride or a mixt. thereof with antimony trifluoride as the catalyst at a temp. of 80-150.degree.C under a pressure of 8-80 kg/cm<sup>2</sup>.

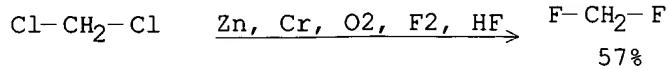
RX(1) OF 1



NOTE: 100.degree.

L20 ANSWER 7 OF 10 CASREACT COPYRIGHT 1998 ACS  
 AN 122:9477 CASREACT  
 TI Preparation of difluoromethane from dichloromethane  
 IN Tsuji, Katsuyuki; Kaga, Kazuari; Tomota, Seiichi; Nakajo, Tetsuo;  
 Nakayama, Hidetoshi  
 PA Showa Denko Kk, Japan  
 SO Jpn. Kokai Tokkyo Koho, 6 pp.  
 CODEN: JKXXAF  
 PI JP 06211707 A2 940802 Heisei  
 AI JP 93-5188 930114  
 DT Patent  
 LA Japanese  
 AB CH<sub>2</sub>F<sub>2</sub> (I) is prep'd. by fluorination of CH<sub>2</sub>Cl<sub>2</sub> (II) by HF in gas phases in presence of catalysts, which contain Zn, Cr, O, and F and have 5-50% fluorination ratio expressed by [Y/(2X + 3)] .times. 100% (where X = Zn/Cr at. ratio, Y = F/Cr at. ratio) and 0.01-0.6 Zn/Cr at. ratio. A mixt. of Cr(NO<sub>3</sub>)<sub>3</sub>.9H<sub>2</sub>O, Zn(NO<sub>3</sub>)<sub>2</sub>.6H<sub>2</sub>O, and NH<sub>3</sub> in H<sub>2</sub>O was stirred and the resulting slurry was dried, pelletized, heated at 400.degree. for 4 h, and treated with HF at 400.degree. to prep. a catalyst contg. Zn 11.8, Cr 52.5, O 23.2, and F 9.5 wt.%. II was fluorinated by HF with the catalyst at 180.degree. to give 57.0% I.

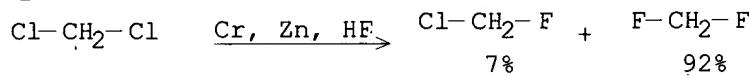
RX(1) OF 1



L20 ANSWER 8 OF 10 CASREACT COPYRIGHT 1998 ACS  
 AN 121:280250 CASREACT  
 TI Preparation of difluoromethane  
 IN Bonniface, David William; Scott, John David; Watson, Michael John

PA Imperial Chemical Industries PLC, UK  
 SO PCT Int. Appl., 15 pp.  
 CODEN: PIXXD2  
 PI WO 9421579 A1 940929  
 DS W: AU, BR, CA, CN, FI, JP, KR, NO, RU, UA, US  
 RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE  
 AI WO 94-GB497 940314  
 PRAI GB 93-6072 930324  
 GB 93-6089 930324  
 DT Patent  
 LA English  
 AB CH<sub>2</sub>F<sub>2</sub> was prep'd. by (a) contacting CH<sub>2</sub>Cl<sub>2</sub> with HF in the presence of a fluorination catalyst to produce a product stream comprising CH<sub>2</sub>F<sub>2</sub>, CH<sub>2</sub>ClF, and unreacted starting materials and (b) sepg. CH<sub>2</sub>F<sub>2</sub> from the product stream from step (a); sufficient HF is employed in the process such that during step (b) the molar ratio of HF to CH<sub>2</sub>ClF is .gtoreq.100:1. The high ratio of HF to CH<sub>2</sub>ClF mitigates toxicity problems assocd. with the latter compd. Thus, a tube reactor contg. Zn/Cr oxide catalyst was pretreated with HF at 300.degree. for 24 h; the reactor was cooled to 250.degree., pressurized with 10 bar N, and a 27.1:1 molar ratio of HF:CH<sub>2</sub>Cl<sub>2</sub> was introduced. The product stream was scrubbed with water to remove HF and HCl leaving a mixt. of CH<sub>2</sub>Cl<sub>2</sub> 1.0, CH<sub>2</sub>ClF 7.1, and CH<sub>2</sub>F<sub>2</sub> 92.0 vol. %.

RX(1) OF 1

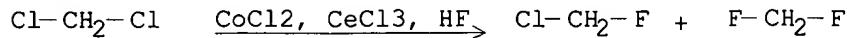


NOTE: OXIDE CATALYSTS

L20 ANSWER 9 OF 10 CASREACT COPYRIGHT 1998 ACS  
 AN 120:216698 CASREACT  
 TI Fluorination of dihalomethane  
 IN Yoshitake, Masaru; Tatematsu, Shin; Morikawa, Shinsuke  
 PA Asahi Glass Co Ltd, Japan  
 SO Jpn. Kokai Tokkyo Koho, 6 pp.  
 CODEN: JKXXAF  
 PI JP 05339179 A2 931221 Heisei  
 AI JP 92-179323 920612  
 DT Patent  
 LA Japanese  
 OS MARPAT 120:216698  
 AB A dihalomethane and HF are reacted in gas phase under (normal) pressure at 150-550.degree. in the presence of a fluorination catalyst comprising at least one metal element selected from Mn and Fe group elements (0.01-20 wt.%/alumina support) supported on an alumina, a part of its O being replaced by halogens. Besides Mn or Fe group elements, the fluorination catalyst addnl. contains at least one metal element selected from alk. earth metals and lanthanide elements. Halomethanes are preferably CH<sub>2</sub>Cl<sub>2</sub>, ClCH<sub>2</sub>F, CH<sub>2</sub>Br<sub>2</sub>, BrCH<sub>2</sub>F, and BrCH<sub>2</sub>Cl. The alumina support has micropore vol. .gtoreq.0.6 mL/g and surface area .gtoreq.150 m<sup>2</sup>/g, and .gtoreq.50% of its micropores have micropore diam. 100-1,000 .ANG.. O is added in the fluorination system. This process uses new non-chrome catalysts which improve conversion ratio of starting materials and show high selectivity and long-lasting activity. Thus, 1,000 g alumina was dried, fluorinated at 300-450.degree. in a stream of HF/N mixed gas, and then chlorofluorinated at 250-300.degree. in a stream of FCCl<sub>3</sub>/HF mixed gas to give an alumina contg. 12 wt.% F and 1.5 wt.% Cl. The latter alumina was immersed in a soln. of 60 g CoCl<sub>2</sub>.6H<sub>2</sub>O in 2L H<sub>2</sub>O, dried, and activated by treatment with a stream of FCCl<sub>3</sub>/HF/N mixed gas at 250-300.degree. to give a catalyst. This catalyst (200 mL) was packed in an U-shaped reactor

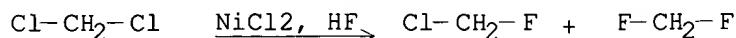
(inner diam. 2.54 cm, length 100 cm) and thereto  $\text{CH}_2\text{Cl}_2$ ,  $\text{O}_2$ , and HF were introduced at 100, 2, and 200 mL/min, resp., and 360 degree. to give  $\text{ClCH}_2\text{F}$  and  $\text{CH}_2\text{F}_2$  with 26 and 73% selectivity, resp., and 72% conversion after 3 days, and 30 and 69% selectivity, resp., and 65% conversion after 65 days.  $\text{CH}_2\text{F}_2$  is useful as a foaming agent and a refrigerant, a potential substitute for CFC-12, HCFC-22, and CFC-115.

RX(1) OF 5



NOTE: gas phase; cobalt chloride and cerium chloride on chlorofluorinated alumina; 75% reaction ratio; 26 and 74% selectivity for chlorofluoromethane and difluoromethane, resp.

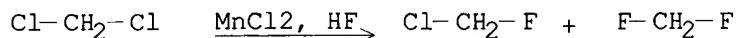
RX(2) OF 5



NOTE: gas phase; nickel chloride on chlorofluorinated alumina; 68% reaction ratio; 28 and 71% selectivity for chlorofluoromethane and difluoromethane, resp.

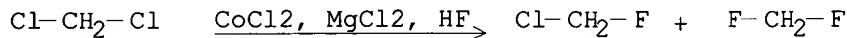
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RX(3) OF 5



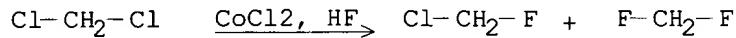
NOTE: gas phase; manganese chloride on chlorofluorinated alumina; 64% reaction ratio; 25 and 73% selectivity for chlorofluoromethane and difluoromethane, resp.

RX(4) OF 5



NOTE: gas phase; magnesium chloride and cobalt chloride on chlorofluorinated alumina; 72% reaction ratio; 22 and 77% selectivity for chlorofluoromethane and difluoromethane, resp.

RX(5) OF 5



A

NOTE: gas phase; cobalt chloride on chlorofluorinated alumina; 72% reaction ratio; 26 and 73% selectivity for chlorofluoromethane and difluoromethane, resp.

L20 ANSWER 10 OF 10 CASREACT COPYRIGHT 1998 ACS

AN 120:163398 CASREACT

TI High oxidation state binary transition metal fluorides as selective fluorinating agents

AU Dukat, Wolfgang W.; Holloway, John H.; Hope, Eric G.; Rieland, Matthias R.; Townson, Paul J.; Powell, Richard L.

CS Dep. Chem., Univ. Leicester, Leicester, LE1 7RH, UK

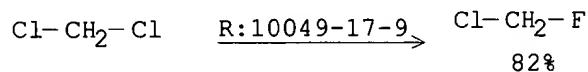
SO J. Chem. Soc., Chem. Commun. (1993), (18), 1429-30  
 CODEN: JCCCAT; ISSN: 0022-4936

DT Journal

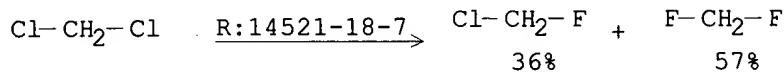
LA English

AB High oxidn. state transition metal fluorides are selective fluorinating agents for CH<sub>2</sub>Cl<sub>2</sub>; those with d0 electronic configurations undergo H-F exchange and metal redn., while dn species undergo Cl-F exchange.

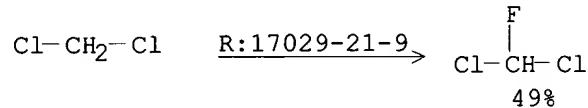
RX(1) OF 5



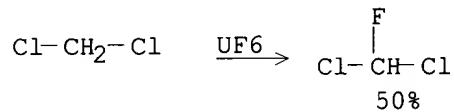
RX(2) OF 5



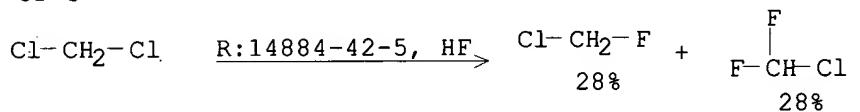
RX(3) OF 5



RX(4) OF 5



RX(5) OF 5



-1- (WPAT)

ACCESSION NUMBER 94-316864/39

CROSS REFERENCE 94-316863

SECONDARY ACCESSION C94-144362

XRPX N94-248843

TITLE Prodn. of difluoromethane - by contacting  
di:chloromethane with hydrogen fluoride in presence  
of zinc-contg. catalyst  
E16 G04 J07 X27

DERWENT CLASSES (ICIL ) IMPERIAL CHEM IND PLC

PATENT ASSIGNEE INVENTORS /  
BONNIFACE DW, SCOTT JD, WATSON MJ

PRIORITY NUMBERS 93.03.24 93GB-006089, 93.03.24 93GB-006072,  
12 patent(s) 29 country(s)

PUBLICATION DETAILS WO9421580 A1 94.09.29 \* (9439) E 12p C07C-017/20  
NW: \*AU \*BR \*CA \*CN \*FI \*JP \*KR \*NO \*RU \*UA \*US  
RW: AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT  
SE  
ZA9401826 A 94.11.30 (9503) 10p C07C-000/00  
BR9406201 A 95.12.12 (9606) C07C-017/20  
Based on W09421580  
EP-690833 A1 96.01.10 (9607) E C07C-017/20  
R: BE DE ES FR GB IE IT LU NL PT  
Based on W09421580  
JP08508029 W 96.08.27 (9702) 10p C07C-019/08  
Based on W09421580  
TW-290531 A 96.11.11 (9711) C07C-017/20  
CN1119431 A 96.03.27 (9744) C07C-017/20  
CN1119432 A 96.03.27 (9744) C07C-017/20  
EP-690833 B1 98.05.20 (9824) E 4p C07C-017/20  
R: BE DE ES FR GB IE IT LU NL PT  
Based on W09421580  
US5763704 A 98.06.09 (9830) C07C-017/08  
Based on W09421580  
DE69410456 E 98.06.25 (9831) C07C-017/20  
Based on EP-690833  
Based on W09421580  
AU-691487 B 98.05.21 (9832) C07C-017/20  
Previous Publ: AU9462134  
Based on W09421580  
CITATIONS EP-128510, EP-502605, W09216482  
APPLICATION DETAILS 94WO-GB00498 94.03.14  
94ZA-001826 94.03.15  
94BR-006201 94.03.14 94WO-GB00498 94.03.14  
94EP-909204 94.03.14 94WO-GB00498 94.03.14  
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94DE-610456 94.03.14 94EP-909204 94.03.14  
94WO-GB00498 94.03.14  
94AU-062134 94.03.14  
MAIN INT 'L CLASS. C07C-000/00 C07C-017/08 C07C-017/20 C07C-019/08  
SECONDARY INT 'L. CLASS. B01J-027/12  
ADD 'L INT 'L CLASS. C07B-061/00  
ABSTRACT WO9421580 A  
Prodn. of difluoromethane comprises contacting

dichloromethane with HF over a n or Zn oxide, fluoride or oxyfluoride catalyst. The catalyst pref.. contains a cpd. of Zn and chromia, chromium fluoride or chromium oxyfluoride.

USE/ADVANTAGE - Difluoromethane (HFA-32) is useful as a replacement for ozone-layer damaging chlorofluorocarbons; for blending with other hydrofluoroalkanes, e.g. HFA-134a and HFA-125, as a replacement for R-22 and R-502 in refrigeration, air conditioning and other applications, e.g. foam expansion cleaning solvents and aerosol propellants. Selectivity to difluoromethane is increased and the amts. of highly toxic by-prod. monochloromonofluoromethane (HCFC-31) are substantially reduced e.g. from greater than 20% to e.g. 7%. The reaction may be run at lower temps. than prior art, resulting in longer catalyst lifetimes. Increased temps. do not result in higher levels of HCFC-31, as with prior catalysts.  
(Dwg.0/0)

-2- (WPAT)  
ACCESSION NUMBER 94-316863/43  
CROSS REFERENCE 94-316864  
SECONDARY ACCESSION C94-144361  
XRPX N94-248842  
TITLE Di,fluoro:methane prepn. process - by reacting di,chloro:methane with hydrogen fluoride in presence of catalyst with reduced prodn. of chloro:fluoro:methane  
DERWENT CLASSES E16 G04 J07 X27  
PATENT ASSIGNEE (ICIL ) IMPERIAL CHEM IND PLC  
INVENTORS BONNIFACE DW, SCOTT JD, WATSON MJ  
PRIORITY 93.03.24 93GB-006072 93.03.24 93GB-0060391  
NUMBERS 12 patent(s) 28 country(s)  
PUBLICATION DETAILS W09421579 AI 94.09.29 \* (9443) E 15p C07C-017/20  
NW: \*AU \*BR \*CA \*CN \*FI \*JP \*KR \*NO \*RU \*UA \*US  
RW: AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT  
SE  
ZA9401818 A 94.11.30 (9503) 15p C07C-000/00  
AU9462133 A 94.10.11 (9504) C07C-017/20  
Based on W09421579  
AU9462134 A 94.10.11 (9504) C07C-017/20  
Based on W09421580  
EP-690832 AI 96.01.10 (9607) E C07C-017/20  
R: BE DE ES FR GB IE IT LU NL PT  
Based on W09421579  
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Based on W09421579  
JP08508028 W 96.08.27 (9702) 14p C07C-019/08  
Based on W09421579  
US5672786 A 97.09.30 (9745) 4p C07C-017/08  
Based on W09421579  
EP-690832 BI 98.05.20 (9824) E 7p C07C-017/20  
R: BE DE ES FR GB IE IT LU NL PT  
Based on W09421579  
DE69410455 E 98.06.25 (9831) C07C-017/20  
Based on EP-690832

Based on W09421579  
ES2115940 T3 98.07.01 (9832) C07C-017/20  
Based on EP-690832  
AU-691486 B 98.05.21 (9832) C07C-017/20  
Previous Publ. AU9462133  
Based on W09421579

CITATIONS US2744148, US2745886  
APPLICATION DETAILS 94WO-GB00497 94.03.14  
94ZA-001818 94.03.15  
94AU-062133 94.03.14  
94AU-062134 94.03.14  
94EP-909203 94.03.14 94WO-GB00497 94.03.14  
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94DE-610455 94.03.14 94EP-909203 94.03.14  
94WO-GB00497 94.03.14  
94EP-909203 94.03.14  
94AU-062133 94.03.14

MAIN INT'L CLASS. C07C-000/00 C07C-017/08 C07C-017/20 C07C-019/08  
SECONDARY INT'L. CLASS. B01J-021/04 B01J-023/06 B01J-023/20 B01J-023/62  
B01J-023/70 B01J-027/12

ADD'L INT'L CLASS. C07B-061/00  
ABSTRACT W09421579 A

Process for the prodn. of difluoromethane (I) comprises: (a) contacting dichloromethane (II) with hydrogen fluoride (III) in the presence of a fluorination catalyst to produce a product stream (PS) comprising (I), monochloromonofluoromethane (IV) and unreacted starting materials; and (b) sepg. (I) from PS. A sufficient amt. of (III) used in the process such that during step (b) the molar ratio of (III) to (IV) is at least 100:1.

Also claimed is the above process further comprising, (c) recovering (I) and recycling (IV) to step (a).

USE/ADVANTAGE - (I) also known as HFA 32 can be used as a replacement for chlorofluorocarbons, esp. in a blend with other hydrofluoroalkanes (such as HFA 1342 and HFA 125) in refrigeration, air conditioning and other applications. Hydrofluorocarbon do not damage the ozone layer. The prodn. of HCFC 31 (IV) is reduced and the conversion of (IV) to (I) is increased. (Dwg.0/0)